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AMERICAN AVIATION

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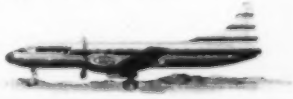

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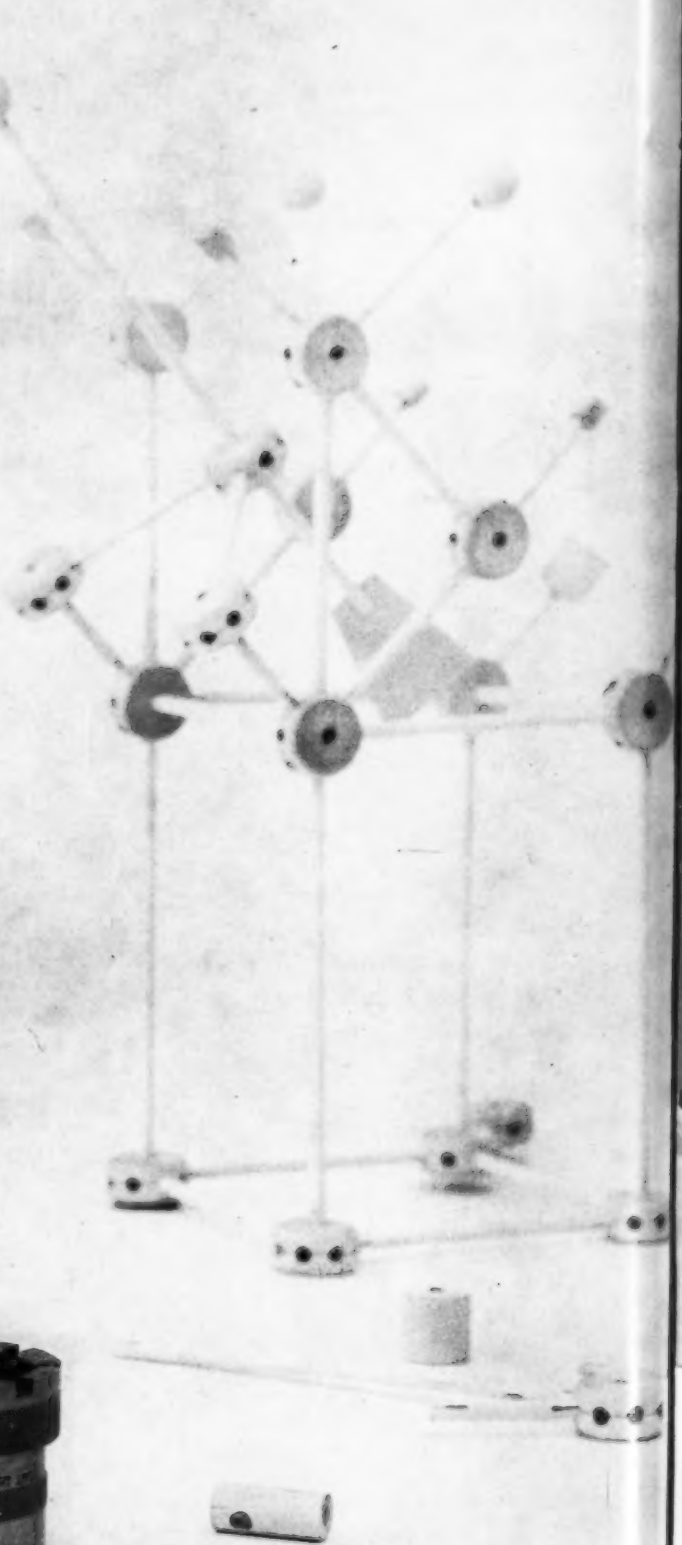

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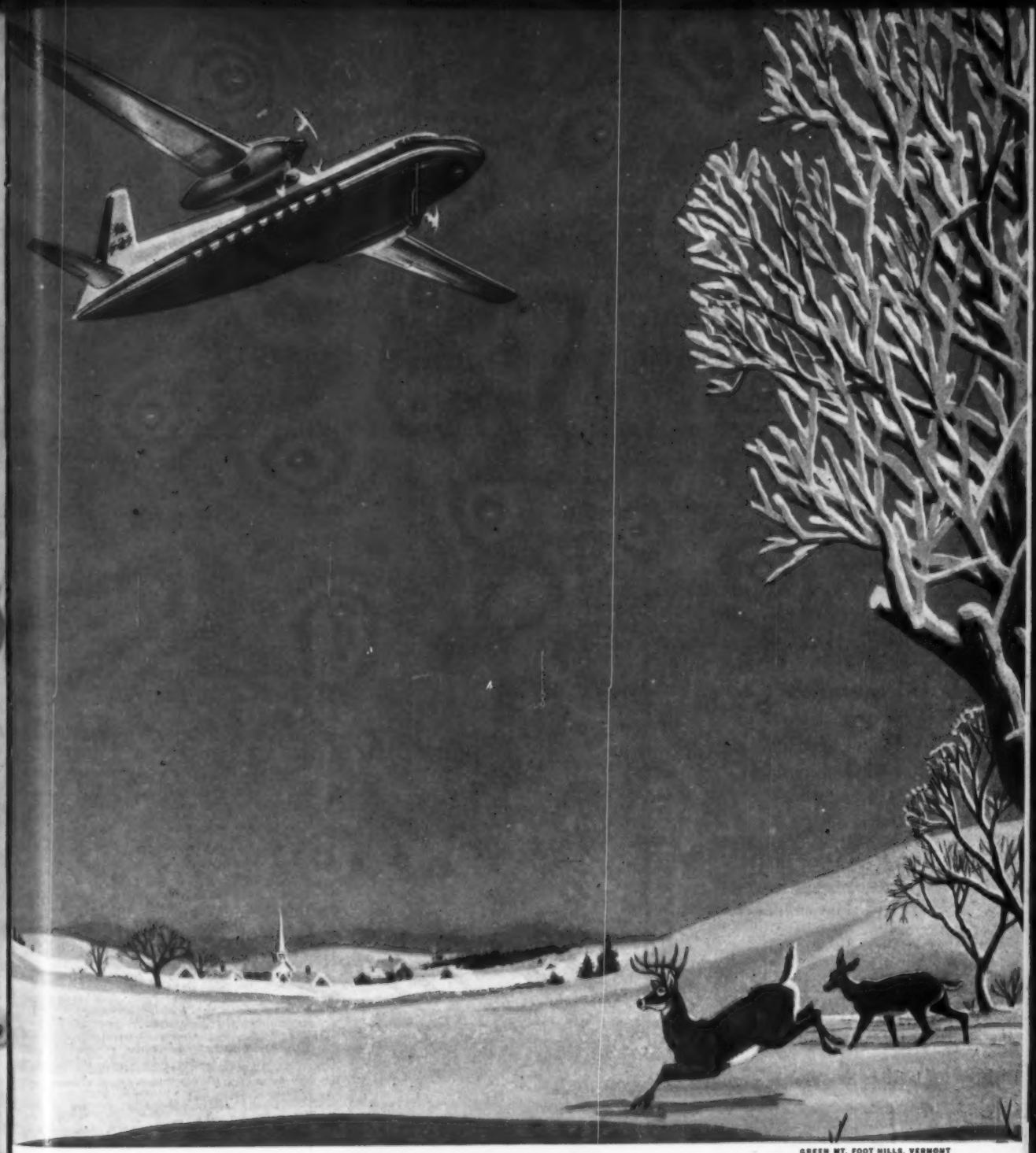

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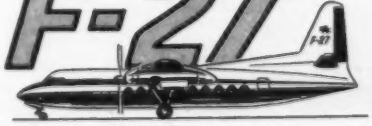

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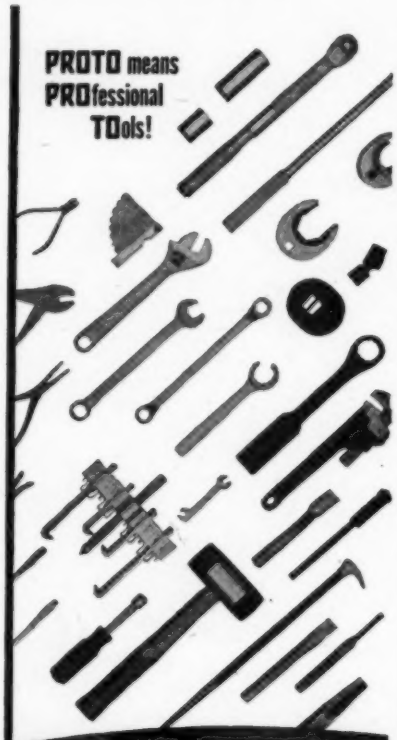

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JULY 15, 1957—VOL. 21, NO. 4

AMERICAN AVIATION

WORLD'S LARGEST AVIATION PUBLISHERS

Air Force takes wraps off X-14

Bell Aircraft Corp.'s jet-powered VTOL, which takes off without auxiliary ground equipment, has successfully completed initial flight tests, Air Force has revealed. For details and pictures, see page 43.

Pilot's report on Temco's new jet trainer

A well-known private pilot describes Temco's new jet trainer, the Navy TT-1, as an "aerial dreamboat." Navy has ordered 14 of these two-place tandem aircraft, is said to be considering buying 300 more. First-hand report, page 44.

Lithium emerges as important aircraft material

Nature's lightest metal is destined to be widely used in nuclear planes, zip fuels, lubricants, metallurgy and ceramics, experts agree. For an analysis of its present uses and future possibilities, see story beginning on page 47.

Navy plans to study radio astronomy

While USAF is taking a new look at Navarho as long-range navaid, Navy is studying possibilities of radio astronomy as a navigational system for surface and underwater vessels. Story begins on page 57.

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How does Pentagon's austerity program affect Navy procurement? . . . That question was posed by AMERICAN AVIATION's military editor Lois C. Philmus to Vice Adm. William H. Davis, Jr., Deputy Chief of Naval Operations for Air. He admits Navy is feeling the budget squeeze, but is facing up to the tight dollar more calmly than Air Force. For complete details see page 33.

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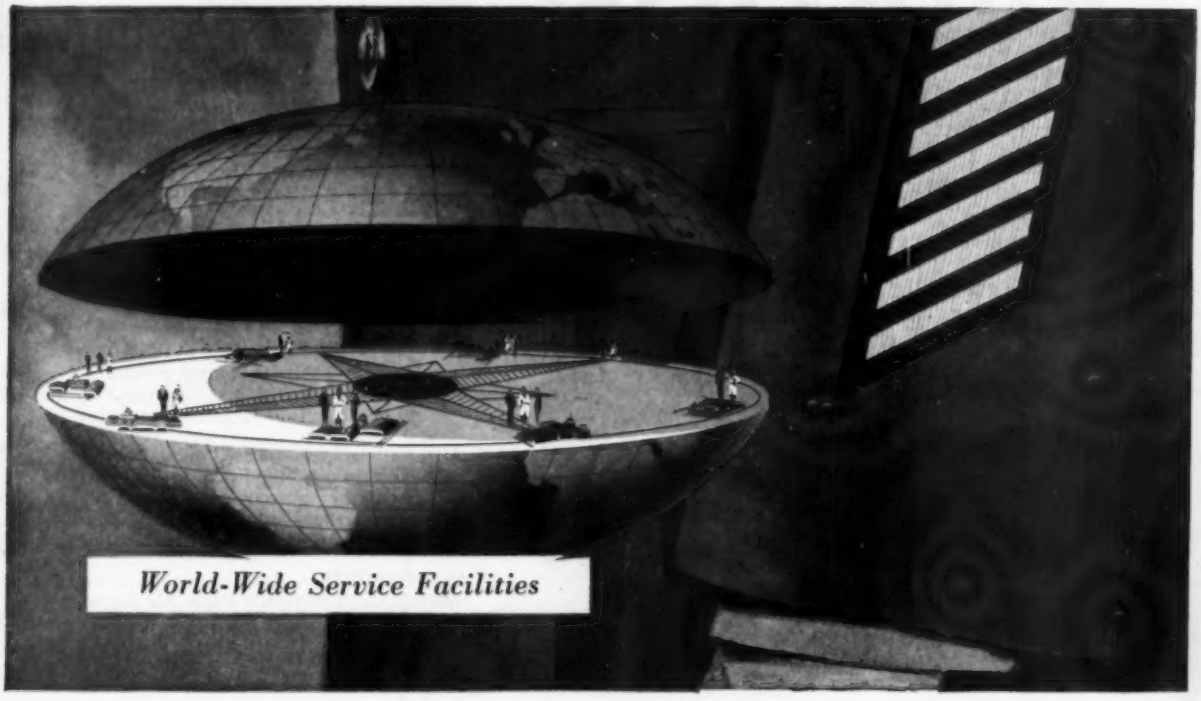

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The tremendous passenger appeal of the Viscount was evident from the very beginning. In the first full year of service, Trans-Canada Air Lines' total Viscount operations achieved a passenger load factor of 81%, and has averaged over 80% for more than two years of service.

Mr. Gordon McGregor, President of TCA, declares that, in his opinion, "the Vickers Viscount is by a very wide margin the best commercial aircraft of its class that has ever been built." He adds that both from the operations and traffic viewpoints, Viscounts "proved the ideal medium-range aircraft." As a result, TCA has ordered a total of 51 Viscounts.

Similar popularity is reported by all the 14 other airlines now flying the Viscount. Their experience proves again that *"wherever the Viscount flies, traffic figures rise"!*

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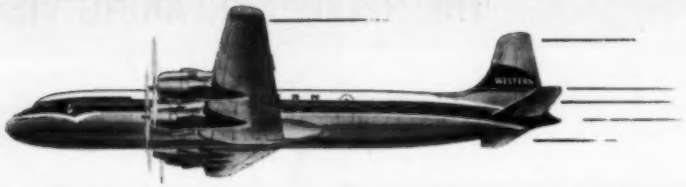
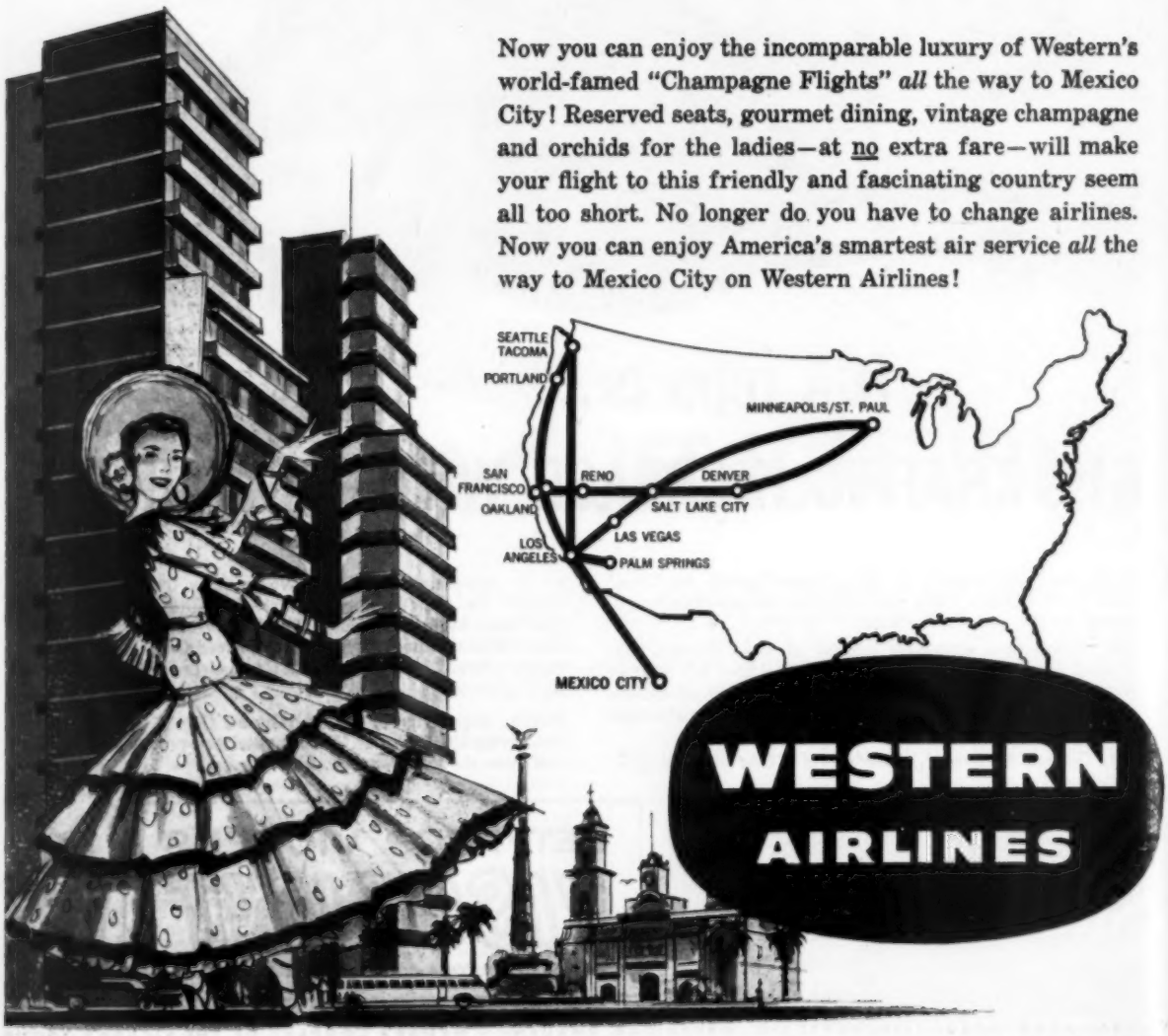


WESTERN AIRLINES

Champagne Flights to MEXICO CITY



Now you can enjoy the incomparable luxury of Western's world-famed "Champagne Flights" *all* the way to Mexico City! Reserved seats, gourmet dining, vintage champagne and orchids for the ladies—at no extra fare—will make your flight to this friendly and fascinating country seem all too short. No longer do you have to change airlines. Now you can enjoy America's smartest air service *all* the way to Mexico City on Western Airlines!

PERSONAL VIEW

Mr. Douglas Could Have Gone Further

Donald W. Douglas, Jr., sparked a good idea in San Francisco the other day, but he didn't go far enough.

He suggested that since it is beyond the capability of private enterprise to finance such big developments as the large C-132 cargo transports now canceled by USAF, and the C-133s now being built, that legislation similar to the Merchant Marine Act of 1936 would be desirable in the national interest.

A sound idea, and very logical. The U.S. has found it desirable to support a merchant marine with government assistance. Today who can question the thesis that large heavy-lift aircraft are just as essential to national security as a merchant marine? The reasons and objectives are identical.

Not only is Mr. Douglas' suggestion appropriate, but it is timely and this is where he could have pursued the matter further. A time of decision is nearing for MATS, the vast, sprawling and costly military air transport service which comprises the world's biggest airline. In fact, the time of decision is fast passing.

The vast MATS fleet is obsolete today. No jets are on order, nor are they likely to be in the immediate future. Thus MATS faces either a costly re-equipment program or continuance of an operation so obsolete as to be of only secondary use in an emergency.

Meantime, we have the irony of USAF canceling a vital program such as the C-132 for lack of funds, and the dilemma of a sprawling and costly operation of an obsolete military transport service. If MATS re-equips, it is certain to put a lot of money in more plush transports for transportation of women and kids, diplomats chiseling free or reduced-fare rides, and other government people who should be using commercial services.

The primary objective of any military transport service should be the lifting of military equipment and personnel. The C-132 and the C-133 programs were along that line. But MATS devotes much of its attention to the kind of passenger service already offered by the airlines and if an emergency arose it would find itself insufficiently equipped to do a good job.

It would seem to be high time for the government to take a new look at military transport. It is time to establish a merchant marine of the air, to develop really big aircraft with really big useful loads and have this equipment operated by commercial carriers. All equipment not needed for purely military operation could be operated commercially.

In the long run, the taxpayers, the military and the carriers would all benefit, to say nothing of strengthening national security. As it is now, MATS is diverting a great deal of business away from commercial carriers at a loss to the public, and doing so with an airplane fleet that is rapidly becoming obsolete. Let's do away with this "make work" program and put the money into aircraft of the future. There is no military advantage to be gained from obsolescence.

If MATS continues on its vast scale and re-equips with jets, it will actually be retarding and crippling the development of new and bigger types of airplanes by diverting funds that should be used for those purposes.

Just Didn't Know Any Better

When an aircraft builder returns money to the government it's pleasant news. But there's more than just the mere item of savings behind the $6 million-plus that Fairchild Engine and Airplane Corp. saved the government on its C-123 contract.

Fairchild was told bluntly by the late Secretary of the Air Force Harold Talbott not to bid on the C-123 contract because the company was already building planes in the same general category. But Fairchild entered a bid anyway, some $15 million below the next highest, incurring the Secretary's ire.

There was much skepticism whether Fairchild could do the job at its low bid price. But somehow or other, under higher Pentagon instructions, the low bid was accepted. And it was on this very same contract that low-bidder Fairchild cut another $6-million from its original bid figure. Quite a performance, plus the fact that in the past three years Fairchild has refunded over $20 million to the government on various contracts.

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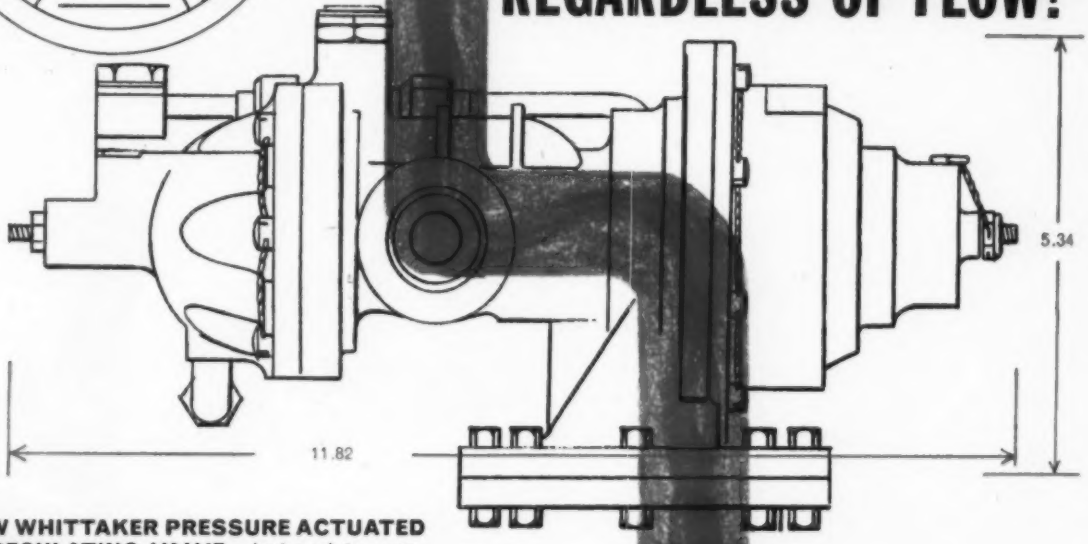

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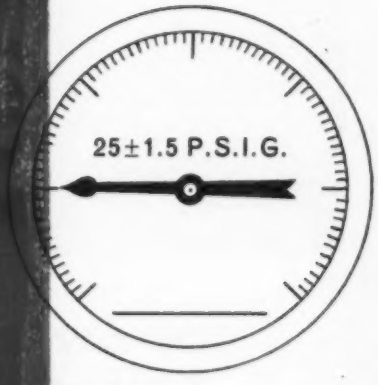
SERVICE	Nitrogen or Helium (in the presence of kerosene vapor)



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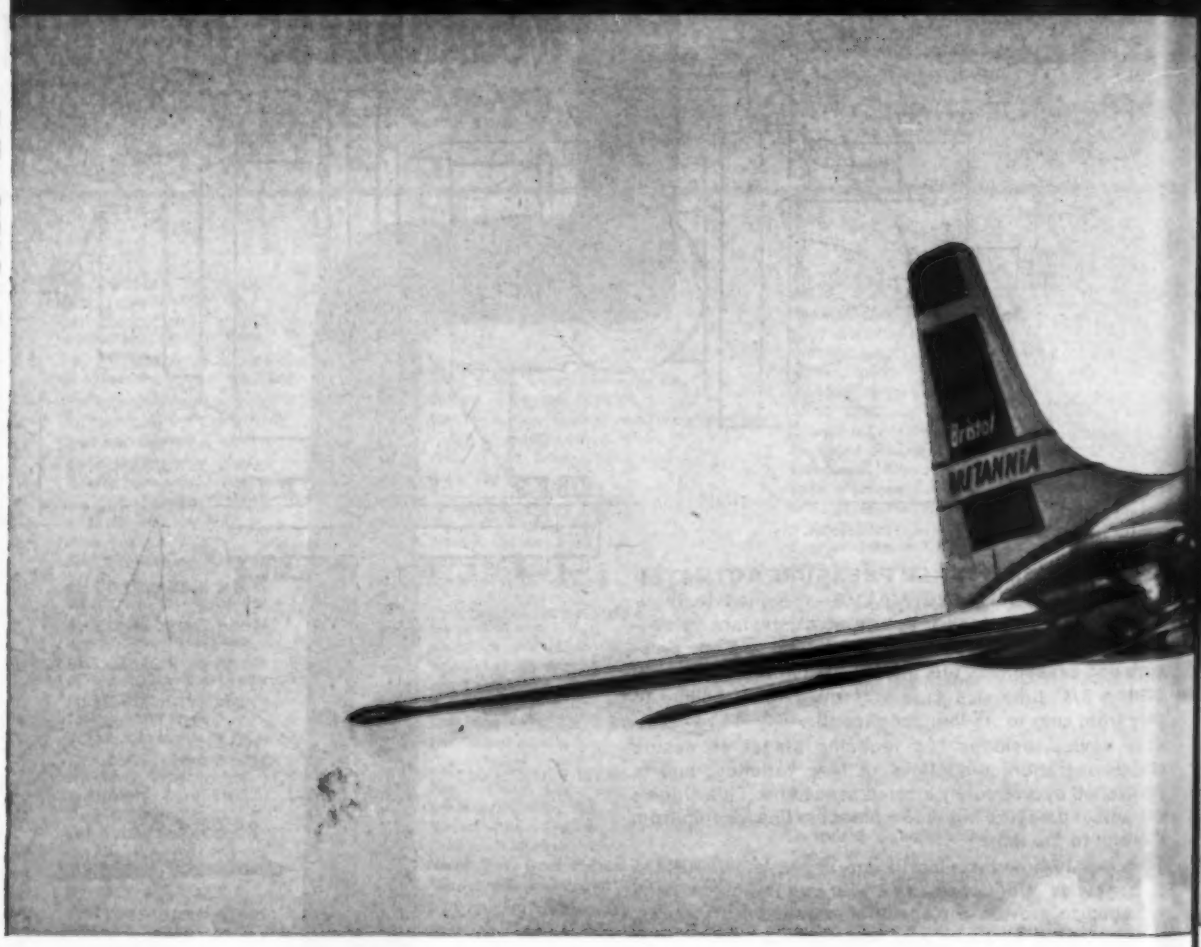

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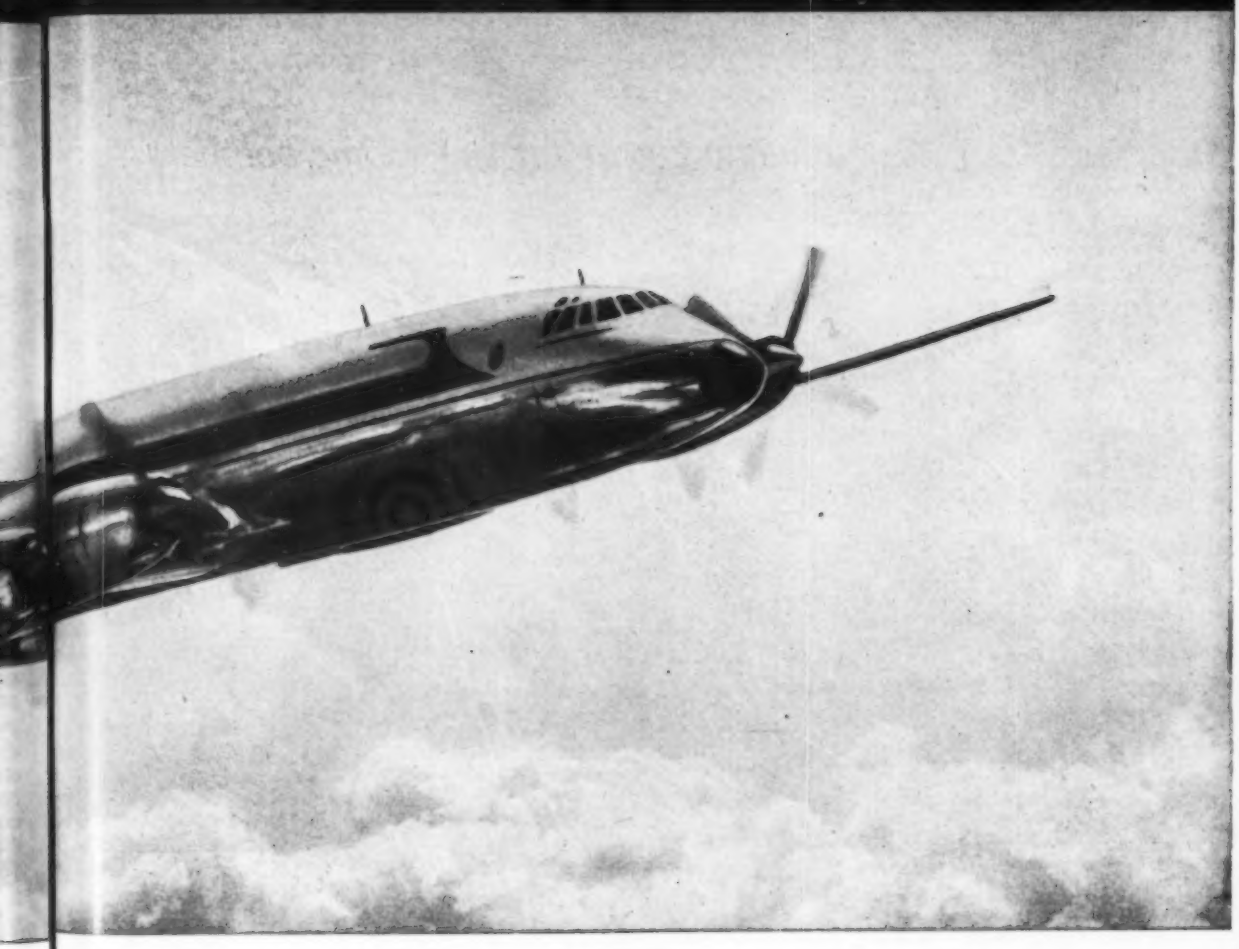
Operators have already chosen Britannias for an amazing variety of stage-lengths, from short 200-mile inter-city routes to long 4,500-mile trans-polar flights.

TRANS-POLAR



Britannias will be flown between New York—Washington and New York—Miami by Northeast; between Havana—New York by Cubana De Aviacion and between Mexico City—New York by Aeronaves De Mexico. The same type of aircraft will be flown nonstop across the Atlantic by BOAC and El Al and on trans-polar and trans-Pacific routes by Canadian Pacific.

Powered by four 4120 h.p. Bristol Proteus turboprop engines, the "Whispering Giant" cruises at 400 m.p.h., carries up to 133 passengers and cuts operating expenses to a new low.

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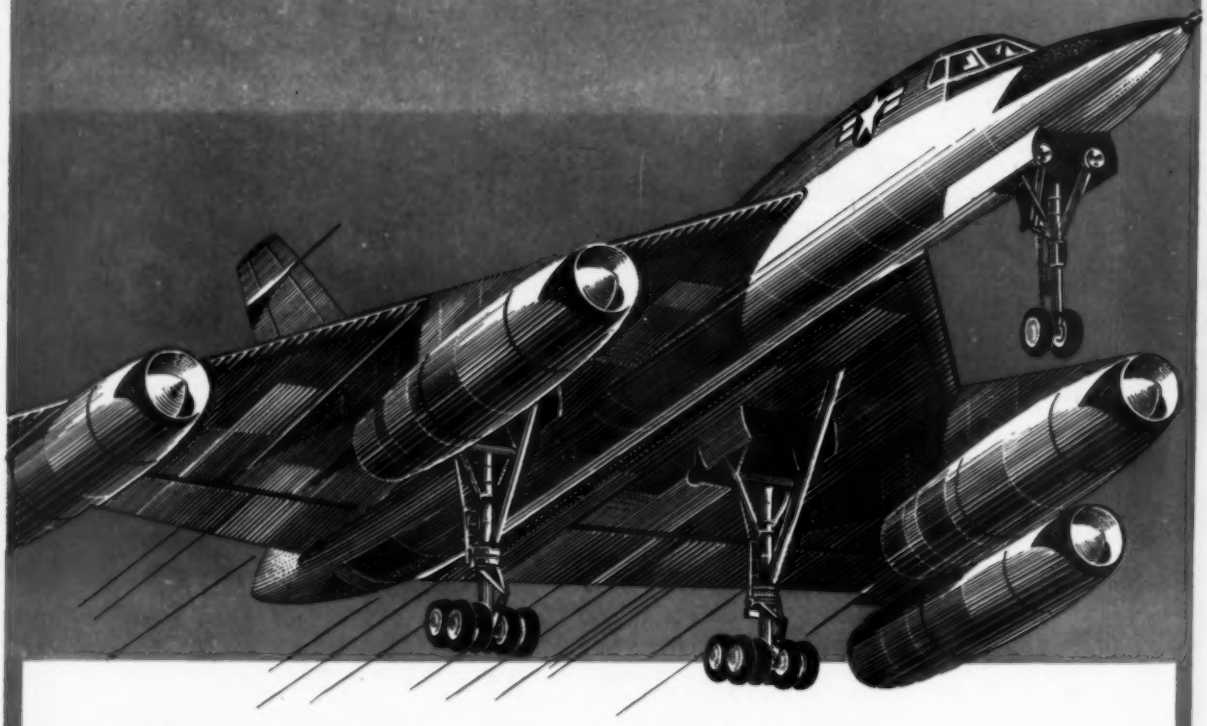

CONVAIR USAF B-58 *"Hustler,"* spectacular in appearance and performance, is the world's fastest bomber. Faster-than-sound, it operates at altitudes above 50,000 feet and has tremendous capabilities for the fast-changing air power concepts.

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LETTERS

Congratulations

To the Editor:

Congratulations on the editorial by Wayne W. Parrish, "When Failures are Normal and Planned," which appeared May 20 in AMERICAN AVIATION.

As pointed out so well, the purpose of testing is not to *achieve* success but to *learn how to achieve* success. Unfortunately, this is not always realized and, as a result, a test program which does not show spectacular success right from the start is often considered indicative of the quality of the article under test.

In stressing the above points, you have rendered a valuable service to the missions of all military services in appealing for understanding of the problems we face. *A. A. ARNHYM, Colonel, USAF, Director of Information Services, ARDC, Baltimore, Md.*

Difference of opinion on bilaterals

To the Editor:

In the June 3 issue you carry a letter from a Claude E. League of Seattle, Wash., in which he reviews bilaterals. At one point he states that in Britain the American carrier "is at the mercy of the BOAC personnel when checking in for their flights and transportation to the airport in London."

This is not entirely true except that, in certain instances, some carriers make use of the services of BOAC and its staff, chiefly because they find them both efficient and economical.

Mr. League also states that he does not understand how BOAC, serving four lucrative air travel centers in the U.S., can block an American air carrier from extending its routes between two non-European countries. In the first place, of course, these matters are not decided by the airlines, but are matters decided between governments. In the second place, it might be drawn to his attention that a single British carrier, BOAC, faces transatlantic competition to the United Kingdom from two of the great American carriers offering many times its capacity. *G. A. W. WYNNE, Public Relations, British Overseas Airways Corp., New York City.*

To the Editor:

As a Dutch citizen now working in the United States as an aeronautical engineer, I appreciate very much having the opportunity to reply to Claude E. League's letter.

First, I would like to advise Mr. League to think twice before again writing about a subject he apparently does not understand. Second, I think it might be very useful for Mr. League to have the following information:

1. KLM-Royal Dutch Airlines, being the largest foreign customer of the U.S. civil aircraft market, could expect some returns from the U.S. Government due to that fact. . . . .

2. The American free enterprise way of doing business (as Mr. League calls it) does not include the ruling out of foreign competitors to protect U.S. carriers. In fact, it will render a very sound effect on the service given by some U.S. airlines if foreign airlines enter the market. (To prevent a remark about government supports: KLM is a privately-owned, profit-making carrier and operates without government support.)

3. How can the size of a country or its population have any effect on the way it should be treated by a larger country, such as the United States? Mr. League's remark about the NATO-ally Holland certainly raises some suspicions about his democratic ideas. (By the way, Holland still has some 11,000,000 people.)

4. What exactly is meant by Mr. League's remark on the former Dutch oil wells in the East Indies and what we have done with these during World War II is not clear to me; what can this possibly have to do with today's aviation. . .

To conclude, I must say that I am sure the people of the U.S. in general have a different attitude towards their allies than Mr. League has. *JAN ROSKAM, Wichita, Kans.*

To the Editor:

One can, I suppose, excuse the jingoistic sentiments in Mr. League's long outburst to you, but it is his obvious ignorance of aviation matters in general that makes reading it so painful. Thus he compares BOAC's traffic rights in America (which are agreed upon between the two governments concerned) with the handling arrangements at London Airport (which is a matter of concern only to individual airlines).

In other words, if an American flag carrier wished to look after its own passengers at London (or for that matter anywhere else in the world) there would be no objections from anyone. It simply means that the U.S. line concerned be-

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lieves the present arrangement to be more economical and, no doubt, more efficient.

As for BOAC's "four air routes in America"—has Mr. League considered the rights granted to U.S. carriers both in Britain and other parts of the Commonwealth? Obviously they are taken for granted.

One may or may not sympathize with KLM's efforts to enlarge their traffic rights, but surely the fact that "Holland is only the size of Vermont" simply does not enter into the argument . . . *PETER R. EASTON, New York City.*

Technical question

To the Editor:

In your June 3, 1957, issue you publish a very interesting article "Materials Breakthrough" on pages 27 through 29 by William Beller.

On page 29 you quote the melting points of various oxides, including MgO (magnesium oxide). For MgO you have given the melting point at 5,072 degrees fahrenheit. This point happens to be of particular interest to me and I should like very much to have the reference from which you obtained this value of 5,072. *F. A. HIERSCH, Continental Aviation and Engineering Corp., Detroit, Mich.*

Editor's Note: "Handbook of Chemistry and Physics" gives melting point of MgO as 2,800°C, which converts to 5,072°F.

To the Editor:

Your article on ductile ceramics (AMERICAN AVIATION June 3, p. 27) was very well written. If it is possible to obtain reprints of this article, would you please let me know . . . EARL R. PARKER, Chairman, *Professor of Metallurgy, University of California, Berkeley.*

To the Editor:

The article in your June 3 edition entitled "Materials Break Through . . ." caused considerable comment throughout our department. Could you send me

a reprint of this article? *Robert M. Schiffman, Development Metallurgy, Curtiss-Wright Corporation, Wright Aeronautical Div., Wood-Ridge, N. J.*

To the Editor:

Our chief research engineer is interested to have a copy of an article on "Materials Breakthrough" which was published in your June 3, 1957, issue of AMERICAN AVIATION.

Can you send us as soon as possible one copy of the June 3, 1957, publication? *(MRS.) ZETA L. PERSON, Librarian, The Heald Machine Company, Worcester, Mass.*

We're happy, too

To the Editor:

As one of the engineers responsible for the design and development of the On Mark Model 450 turboprop executive transport, it was with the greatest pleasure that the article in the May issue of AMERICAN AVIATION by Fred Hunter was brought to my attention. *BERNARD KREITZER, Structures Engineer, On Mark Engineering Co., Van Nuys, Calif.*

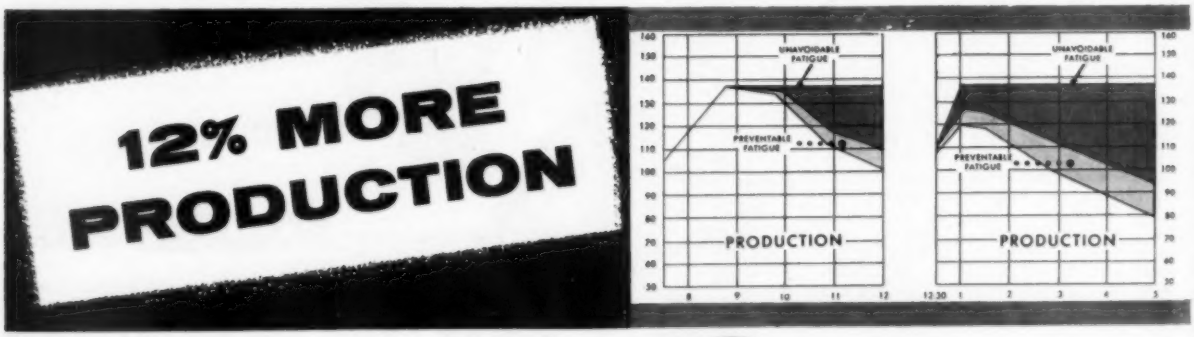
Praise from France

To the Editor:

Since its beginning, we have followed AMERICAN AVIATION Magazine and appreciated its continuous expansion and growing authority. The articles which you publish are always interesting; their variety brings to light genuine information concerning all fields of aviation. To us AMERICAN AVIATION is an excellent background for study. . . . *P. MAZER, chairman of the board and president, S.N.C.A.N., Paris.*

To the Editor:

I can only congratulate you for the new presentation of AMERICAN AVIATION which offers a great deal of information under a very attractive format. *M. GUILBOT, executive vice president, Union Syndicale des Industries Aéronautiques, Paris.*



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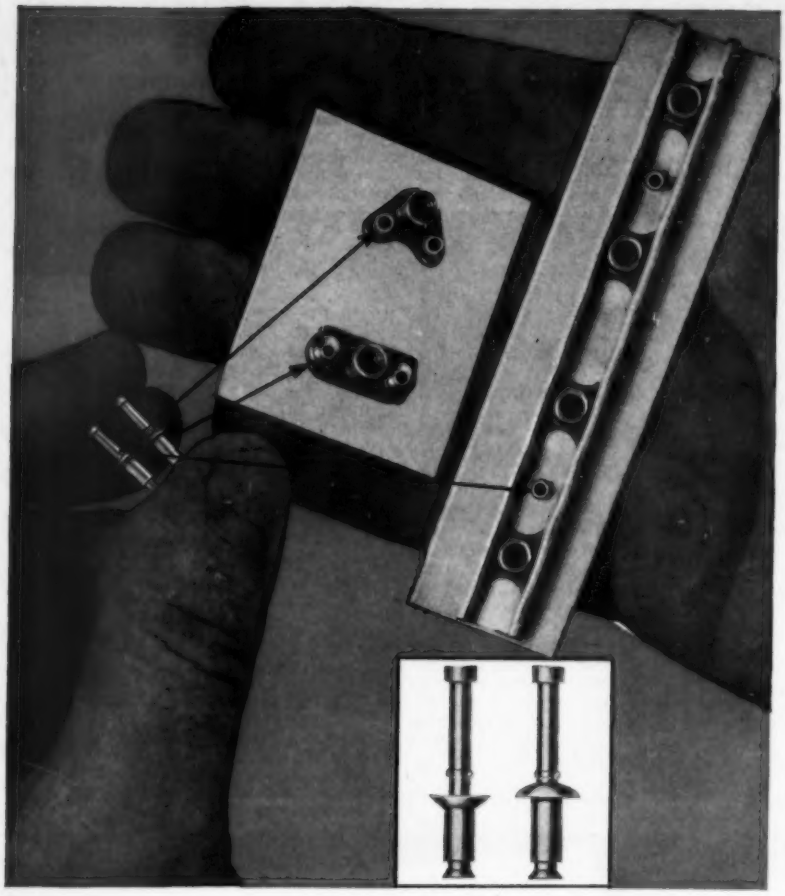

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WHEN-WHERE

JULY

All-Woman International Air Race, McAllen, Tex., to Cuba, July 17-20.

National Flying Club Convention, sponsored by National Flying Club Assn., Inc., Denver, July 30-Aug. 2.

Air Force Assn., convention, Washington, D.C., July 30-Aug. 4.

AUGUST

IAS Naval Aviation Meeting, U.S. Grant Hotel, San Diego, Aug. 6-10.

International Air Show and Midget Airplane Racing, sponsored by Oshkosk Air Show Corp., Winnebago County Airport, Oshkosh, Wis., Aug. 9-11.

International Ignition Conference, sponsored by Bendix Scintilla Div., Sidney, N.Y., Aug. 20-22.

Western Electronic Show & Convention, Cow Palace, San Francisco, Aug. 20-23.

National Flying Farmers Assn., annual convention, Municipal Airport, Wichita, Kans., Aug. 25-29.

Experimental Aircraft Assn., annual fly-in and convention, Curtiss-Wright Airport, Milwaukee, Aug. 30-Sept. 1.

SEPTEMBER

Royal Aeronautical Society and IAS 6th International Aeronautical Conf., Folkstone and London, Sept. 1-15.

SBAC annual air show, Farnborough, England, Sept. 2-8.

IATA annual general meeting, Madrid, Sept. 9-14.

ASME fall meeting, Hotel Statler, Hartford, Conn., Sept. 23-25.

SAE aeronautic meeting, Aircraft Production Forum and Aircraft Engineering Display, Ambassador Hotel, Los Angeles, Sept. 30-Oct. 5.

OCTOBER

National Business Aircraft Assn., 10th meeting & forum, Denver, Oct. 2-4.

International Northwest Aviation Council, annual convention, Palliser Hotel, Calgary, Oct. 6-8.

13th Annual National Electronics Conference, Hotel Sherman, Chicago, Oct. 7-9.

Triennial inspection of NACA Lewis Propulsion Laboratory, Cleveland, Oct. 7-10.

International Union of Aviation Insurers, annual general meeting, Amsterdam, Holland, Oct. 8-11.

Society for Experimental Stress Analysis, national fall convention, El Cortez Hotel, San Diego, Oct. 9-11.

National Noise Abatement Symposium, sponsored by Armour Research Foundation of Illinois Institute of Technology, Sherman Hotel, Chicago, Oct. 10-11.

Canadian IRE, convention-exposition, Automotive Bldg., Exhibition Park, Toronto, Canada, Oct. 16-18.

National Assn., of State Aviation Officials, annual meeting, Sun Valley, Idaho, Oct. 16-18.

American Helicopter Society, annual western forum, Statler Hotel, St. Louis, Mo., Oct. 20-22.

Canadian Aeronautical Institute-IAS meeting, Montreal, Oct. 21-22.

Computer Applications Symposium, sponsored by Armour Research Foundation, Hotel Sherman, Chicago, Oct. 23-24.

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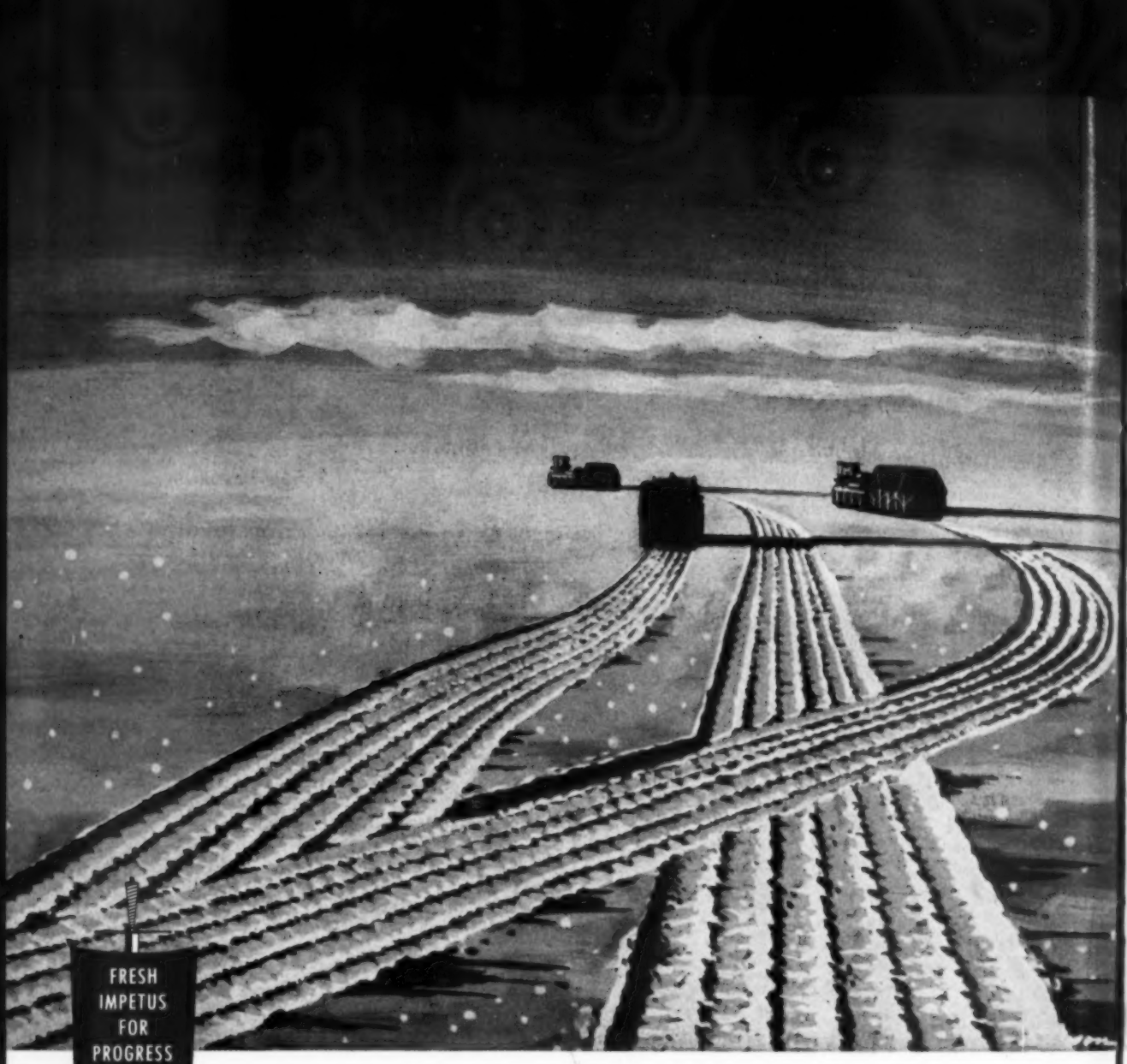

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AIRTRENDS

Aircraft industry attorneys have asked for a meeting next month with Pentagon General Counsel Robert Dechert and his staff. Purpose is to work out an answer to the tax mess in which the companies are currently embroiled in California. (Story, p. 22)

During the past four years, the companies have paid some $22 million in personal property taxes to several California counties. They have been reimbursed for these payments by the Defense Department pending a determination of the validity of the assessments. Following a trial court ruling in June holding the taxes unconstitutional, the Pentagon announced it will no longer reimburse contractors for such payments.

But the counties have given no sign of desisting in their efforts to collect the taxes. Just the opposite, in fact. They are appealing the lower court ruling to the State Supreme Court, and they have sharply increased their bite on the companies. Result: the companies are caught in a tax squeeze which could relieve them of $25 million this year.

A fight may be shaping up on extension of the War Powers Act, authorizing important progress payments to manufacturers. The House routinely gave the act a one-year lease on life. But Sen. James O. Eastland (D-Miss.), chairman of the powerful Judiciary Committee, isn't satisfied. He says he'll hold out for Senate hearings. The House skipped hearings this year.

Top USAF information officers shot down two of the Coolidge Committee's prize examples of security "leaks" damaging to U.S. defense. They told the Moss Information Subcommittee that an Air Force Association speech by Brig. Gen. Don R. Ostrander, listing USAF missile contractors, was formally cleared beforehand. Coolidge had called the list "unauthorized disclosure." USAF officials also conceded that stories on speed of X-2 research plane were probably the work of knowledgeable reporters, not security leaks. Chairman John E. Moss (D-Calif.) hints that his group will come up with recommendations to put the security question back in perspective. USAF apparently would welcome such a move, since it has gone on record favoring more public information on missile progress.

Defense Department has allowed USAF a six-month delay in the deadline it set for compliance with its "full funding" directive, No. 7200.4. This means USAF will be able to operate through calendar 1958 with no major dislocations in its procurement program. It's hopeful of working out satisfactory arrangements later on for full coverage of all letter contracts.

Battle capability of U.S. Sixth Fleet in the Mediterranean is scheduled to expand sharply this month. Arrival of the carriers Franklin D. Roosevelt and Randolph with two squadrons of Douglas A3D attack bombers will double the fleet's long-range bomber strength. Sparrow-equipped McDonnell F3H-2N fighters are expected and the Randolph may bring some Regulus I missiles. Also expected is the cruiser Canberra, which will provide Terrier missile defenses.

House subcommittee is scrutinizing the experience and "maturity" of almost 8,000 defense department contract officers and negotiators. Hebert investigations subcommittee was "shocked" by impression that relatively young and inexperienced contract officers are negotiating with seasoned industry reps.

DIGEST

Defense ruling on personal property taxes heightens financial problems of California aircraft manufacturers

by Fred S. Hunter

LOS ANGELES—California aircraft manufacturers' troubles with the local tax collectors continue to grow despite a favorable first-round decision in the courts. Following a ruling by the Superior Court in Los Angeles that taxes levied on federal government-owned property are invalid, the government has notified the aircraft manufacturers that personal property taxes for the 1957 calendar year will not be recognized as an element of costs.

But the California counties, pending their appeal of the Superior Court ruling, are continuing to levy the taxes and say the manufacturers must pay. Moreover, assessments are being upped in staggering amounts. Northrop, for example, was assessed approximately $900,000 in 1956. Its 1957 bill is about $2 million. North American's 1957 assessment is estimated at nearly $7 million, as against approximately $2 million in 1956. Douglas totals $6.2 million, or more than the total for the four previous years.

This local tax problem started in 1953. That was the first time county assessors, seeking new avenues for tax revenues, seized on work in progress on government contracts in defense plants. They levied personal property taxes against materials still in the hands of the contractors and not yet paid for by the federal government in its progress payments.

The Department of Defense and the Department of Justice decided these taxes were illegal and two companies, General Dynamics Corp. and Aerojet-General Corp. were requested by the Air Force and the Navy to litigate their validity in the California courts. The General Dynamics suit was filed by its Convair-Pomona division. These two companies were selected for the test suits, which were filed in Superior Court in Los Angeles in late 1954, because their contracts covered practically all of the different type contracts issued by government defense agencies.

On June 10 this year, the court held that the taxes were invalid and ordered refunds to be made to Aerojet and Convair. In handing down the decision, the trial judge said title to the inventories and productive equipment were vested in the United States government and ruled that the plaintiff-contractors (Aerojet and Convair) had no taxable interest on any basis in any of the property.

The county has announced it will appeal this lower court decision. How far the litigation may be carried remains to be seen. The decision to initiate the action in the state court under California law rather than in federal court was made by the government—possibly from a public relations viewpoint—but it probably will be taken to the U.S. Supreme Court eventually anyway, unless an unexpected compromise is reached en route.

Meanwhile, the county assessor has attempted to change the basis of the assessment and also has sought to include government-owned property which had not previously been included in the original assessment in 1953. No credit is allowed for partial payment on materials and the tax assessment is made on the full inventory valuation. This accounts for the steep increases in 1957 assessments.

The government has advised defense contractors that in the event, at a future time, "a court of last resort" should determine the California taxes are valid, reimbursement will be made. Meanwhile, these taxes will not be considered an allowable cost in cost-type contracts nor as part of a negotiated price in firm fixed-price contracts. Similarly, the taxes will not be considered as incurred in the performance of incentive or redeterminable contracts. In any contract where progress payments are based on costs, the taxes will not be an item of cost.

California defense contractors also express concern over the turn of events because of the unfavorable competitive situation that may be created. Defense agencies are examining prices more closely than ever.

"You can't add $6 or $7 million to your costs without increasing your prices," one finance man observed. "Areas without this tax burden will have a definite advantage in procuring contracts."

$106 million for NACA

House-Senate conferees have approved $106 million of the fiscal 1958 budget request of the National Advisory Committee for Aeronautics. Last year NACA got $77 million. Meanwhile, NACA asked the Senate and Armed Services Committee to consider adding Army representatives to the advisory group.

MATS reorganizes under 'single manager' concept

Military Air Transport Service has been reorganized to facilitate its operation under the "single manager" type of administration which went into effect July 1, Air Force has announced.

Transportation responsibilities of MATS' three main divisions were realigned. Atlantic Division, with headquarters at McGuire Air Force Base, N. J., will concentrate on flights to Europe, the United Kingdom, Iceland, Greenland, Newfoundland and Labrador.

Atlantic Division will have two transport wings, at McGuire and at Dover AFB, Del.; two overseas support wings, at Lajes in the Azores and Prestwick, Scotland; and three Naval support squadrons, including two new ones shifted to MATS as a result of the Hoover Commission proposals.

Two former Atlantic Division bases were shifted to the Continental Division. These are Kindley AFB, Bermuda, and Charleston AFB, S. C. Continental Division also will assume jurisdiction over the 63rd Troop Carrier Wing at Donaldson AFB, Greenville, S. C. and the 62nd Troop Carrier Wing at Larson AFB, Wash.

Continental Division Headquarters will remain at Kelly AFB, Tex. Division will be responsible for regularly scheduled flights to Africa, the Caribbean, Bermuda and South America.

Pacific Division will handle all operations in the Pacific including all flights to Alaska. The 1705th Air Transport Group at McChord AFB, Wash., will be transferred from Continental to Pacific Division.

The division's 1503rd Air Transport Wing will be transferred from Tokyo International Airport to Tachikawa Air Base, Japan, and will be augmented by addition of the 374th Troop Carrier Wing of the Far East Air Force. Pacific Division Headquarters will remain at Parks AFB, Calif.

Gen. Baker to retire as AF procurement chief

Maj. Gen. David H. Baker will retire July 31 from his post as Director of Procurement and Production for the USAF Air Materiel Command. It is understood he will take an important job in a non-defense industry, but he has not disclosed what this will be.

News of Gen. Baker's retirement came as something of a shock to Air Force Materiel officials in Washington and at AMC headquarters in Dayton. He was slated to replace Maj. Gen. Daniel F. Callahan as Assistant for Programming to the Deputy Chief of Staff for Operations.

Gen. Baker gained a considerable reputation in recent months because of his grim predictions of the future for aircraft and missile companies during the transition to guided missiles.

Hebert committee calls officials of leading engine companies in major probe of industry, government practices

Officials of the nation's leading aircraft engine manufacturing firms were slated to appear before Congress this week as House probers launched a major investigation of the industry.

The Hebert Armed Services Investigations Subcommittee, announcing a starting date of July 18, named the Curtiss-Wright Corp. as its lead-off witness. Representatives from Pratt & Whitney, Westinghouse and General Electric were also due to be heard during the first week.

Altogether, 15 powerplant manufacturers have been asked to testify during the first comprehensive investigation of the aircraft engine industry (AMERICAN AVIATION, April 8).

The subcommittee says it will seek to determine if the firms are reaping excessive profits—and whether the Air Force and Navy are bargaining sharply enough.

But it was virtually certain the inquiry would swing wide enough to encompass the effects of possible Defense cutbacks and stretchouts.

Investigators are also expected to ask what firms plan to do about empty plant space if big curtailments are ordered.

F. Edward Hebert (D-La.), stressing the scope of the probe, said the Air Force bought more than 5,000 engines during calendar year 1956, and expects to purchase a somewhat smaller volume this year. Navy probably will purchase more than 2,000 jet and piston engines in 1957, Hebert said.

Thorne-Holst (left) and Hereil sign contract as aides look on.

SAS orders six Caravelles

Scandinavian Airlines System has ordered six Caravelles for delivery in 1959. They will be used first on the Stockholm-London route, eventually on all SAS major European and Near Eastern routes.

Henning Thorne-Holst, president of SAS, and Georges Hereil, president of Sud-Aviation, manufacturer of the French jets, signed the $12-million contract for their respective companies. SAS also has taken an option on 19 more Caravelles.

Strategic Industries Assn. elects Worthen president

William L. Worthen, president of Bone Engineering Corp., Glendale, Calif., has been named president of Strategic Industries Assn. He succeeds Leo A. Pfankuch, executive vice president of Pacific Scientific Corp.

SIA is a group of independent firms engaged in defense production.

Also named to positions in the group were: E. C. Burkhart, president of Genisco, Inc. vice president and vice chairman of the board; Frank Gaines, president of Gaines Co., vice president; Roy Klotz, vice president of Anadite, Inc., vice president; Victor Silber, president of The Special Corp., vice president; O. Riggs, president of Grimley Engineering Corp., treasurer; William Eaves, sales manager of Calcor Corp., secretary.

Members of the 15-man board include: T. C. Coleman, president of Coleman Engineering Co.; James I. Mahony, owner of Mahony Engineering Co.; Duane Denney, vice president of Mid-Continent Manufacturing, Inc., Fred Morgan, president of Products Techniques, Inc.; D. L. Leavitt, president of Roylyn, Inc.; Fred M. Wells, president of Fred M. Wells, Inc.; Alvin I. Schoellerman, President of Thermo-Form, Inc.; Hampden Wentworth, president of Longren Aircraft Co.; also Pfankuch, Worthen, Burkhart, Gaines, Klotz, Riggs and Eaves.

Kaman, Goodyear receive Army contracts

Kaman Aircraft Corp. has received a $184,006 contract from Army to study the flight characteristics of an aircraft using a "cold rotor" propulsion system. The system vents compressed air directly from the nozzles mounted on rotor tips.

The air in the "cold rotor" system is not mixed with fuel and burned in the nozzles as in the case of the McDonnell XHCH and Hughes flying cranes, but is ejected cold.

The Army also awarded Goodyear Aircraft Corp. $76,105 for preliminary design study on the Convoplane VTOL proposal.

Northrop gets $73-million order for Snarks

Northrop Aircraft, Inc., has received a $73-million contract for production of the first inventory quantity of the Snark SM-62 intercontinental guided missile.

Deliveries are expected to start in the second half of fiscal 1958 to Strategic Air Command.

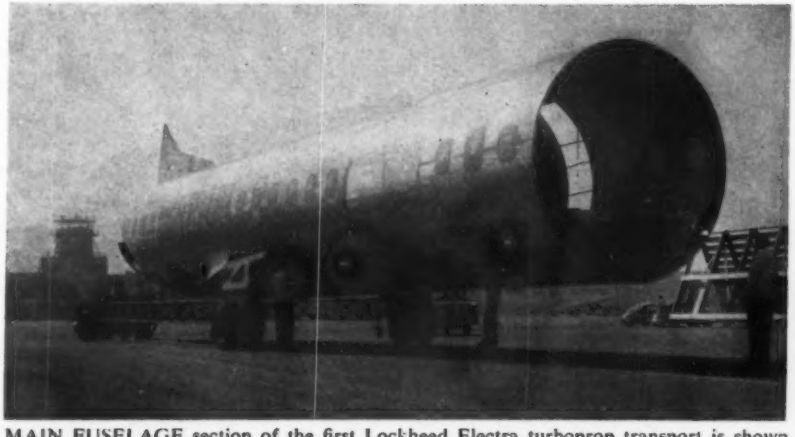
Northrop has assigned about 7,800 personnel to the Snark project and work on the new contract is under way.

Air Force awards GE, Avco missile nose cone contracts

Two contracts totaling $269 million for the development of ballistic missile nose cones have been awarded by Air Force.

General Electric's Missile and Ordnance Systems Department was awarded a $158-million contract to develop a nose cone for Atlas ICBM and Thor ICBM. Research and Advanced Development Division of the Avco Manufacturing Co. received a $111-million contract for work on the Titan ICBM nose cone.

Electra fuselage moves into final assembly



MAIN FUSELAGE section of the first Lockheed Electra turboprop transport is shown being moved to final assembly hangar following completion of pressure tests. Section shown is nearly 80 feet long, 128 inches wide, will accommodate 91 passengers. Overall length of Electra is 104½ feet. First flight is scheduled for January.

BRIEFS

Manufacturing-military

Pratt & Whitney Aircraft division of United Aircraft has received a $28-million contract from Navy for purchase and installation of a wide variety of shop and test equipment for P&W'S West Palm Beach, Fla., plant.

Edmund T. Price will resign as chairman of the board of Solar Aircraft Co. next week. He will become professor of human relations at California Western College, San Diego. Price, who has headed Solar for 28 years, will continue as a director of the company.

Ryan Aeronautical Co. has received contracts totalling $16 million from Boeing Airplane Co. for KC-135 fuselage sections.

Dr. D. P. Barnard has been sworn in as Deputy Asst. Secretary of Defense for Research and Engineering.

Hayes Aircraft Corp.'s rotor- and fixed-wing aircraft maintenance contract at the Army Aviation Center, Fort Rucker, Ala., was renewed July 1 for a total of $6,161,925.50. Hayes' employment at Fort Rucker is about 1,000.

Cessna Aircraft Co. and the **International Assn. of Machinists** have signed a two-year pact providing a 7¢-per-hour wage boost, adding Friday after Thanksgiving as a seventh paid holiday, a company-paid retirement plan, seniority on a division-wide basis, and longevity pay on a company-wide basis.

Final details of Boeing proposal to center B-52C production at the Wichita Division and Bomarc production at Seattle are being worked out at Air Materiel Command.

Japanese Defense Agency will buy 28 helicopters from the United States during the 1958 fiscal year. These include 10 Bell 47Gs, 16 Sikorsky S-55s and two Sikorsky S-58s.

U.S. and Canada have signed an off-shore procurement agreement of $43 million to provide 53 CF-100 all-weather fighters to the Belgian government.

Michael E. Gluhareff, chief engineer at Sikorsky Aircraft Division since 1942, has succeeded Igor I. Sikorsky as engineering manager.

Adm. John H. Cassady USN (ret.) has been elected president of Flight Safety Foundation, Inc., succeeding Rear Adm. Luis de Florez.

Transport

Lewis C. Burwell, Jr., has been elected chairman of the board of directors of Overseas National Airways. He recently resigned (see Page 94) as vice president and assistant to the president of The Flying Tiger Line.

Alfred R. Stout has been named by CAB to fill the post of commercial rates section chief, succeeding the late Louis P. Sissman.

American Airlines will introduce DC-7 nonstop service between Boston and Los Angeles beginning August 1. The daily schedule, first nonstop between the two cities, will trim an hour from existing flight times.

Robert E. Smith has returned to Pan American World Airways as assistant vice president after having been on loan to LACSA for five years.

University of Miami Aviation Administration Division will conduct an Air Cargo Symposium and Executive Development program July 22-26. Tuition is $50. Pan American, Eastern, National, Delta and Riddle air lines are cooperating in the project.

Pakistan International Airlines has ordered two Super-H convertible Constellations for delivery early next year.

United Air Lines has flown more than 11,500,000 passengers, about 280 million pounds of mail and 350 million pounds of freight between Chicago and San Francisco and intermediate points since beginning the service July 1, 1927.

New York Airways has carried its 100,000th passenger and completed its 2 millionth scheduled passenger mile. It started scheduled helicopter service July 8, 1953.

Charles F. Willis, Jr., president of Alaska Airlines, has been elected executive vice president of the National Pilots Association.

Western Air Lines will start service to Mexico July 15 under its recent Los Angeles-Mexico City authorization.

AVIANCA (Colombian National Airways) has begun twice-weekly service from New York to Bogota, Quito and Lima, via Jamaica, using Constellation equipment.

FINANCIAL

Chance Vought Aircraft is offering $12.5 million worth of stock through Harriman Ripley & Co., Inc. and associates. The issue is of 5½% subordinated debentures due July 1, 1977, convertible into common stock to and including July 1, 1967, at $40 a share.

Lear, Inc., board of directors voted a 15¢ cash dividend payable July 29 to common stock shareholders of record July 15.

Consolidated Electrodynamics Corp., through Blyth & Co., Inc., has placed privately 100,000 shares of common stock with institutional investors.

Beech Aircraft Corp. board of directors has declared a dividend of 30¢ per share, payable July 22 to holders of record July 11.

Northrop Aircraft has reported net income for the third quarter of the current fiscal year at $1,313,331, 86¢ a share, compared to $1,114,634, 74¢ a share, a year ago.

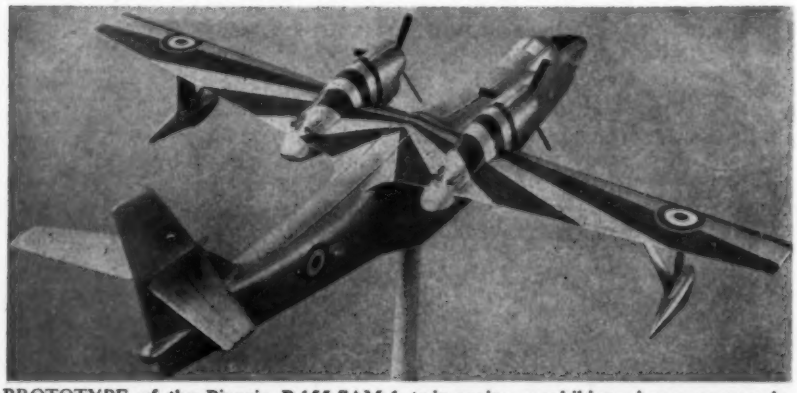
Topp Industries, Inc., reports net earnings of $466,796, 82¢ per share, for the fiscal year ended April 30. This is five times the amount realized the year earlier.

Curtiss-Wright Corp.'s preliminary figures for the six months ended June 30 indicate that shipments for period will exceed $300 million and earnings from commercial sales will approximate 65% of the total profit. Shipments during same period a year ago were $279 million.

Lockheed Aircraft Corp. is writing off about $20 million this year and expects to write off another $11 million next year against cost of developing Electra turboprop airliner. Earnings during first six months of 1956 were about $7.1 million on sales of more than $400 million.

Bendix Aviation Corp. reports consolidated net income for six months ending March 31 of $12,989,411, $2.57 a common share on sales and other income totaling $346,484,633. Year ago at same time income was $10,291,295 or $2.14 a share on sales of $288,182,912.

Model of Italian amphibian rescue aircraft



PROTOTYPE of the Piaggio P.155-SAM-1 twin-engine amphibian air-sea rescue aircraft has been ordered by Italian Air Force. Powerplants will be two P&W R2800-CB3s, with three-blade Hamilton Standard propellers. Aircraft will accommodate 10 litters, plus 5-10 passengers and crew of seven. Maximum speed is 216 knots, service ceiling 23,400 feet, range up to 1,950 naut. miles (at slow cruise). First flight is scheduled for 1959. Model shown.

Chief pilots Frank M. Briggs and Richard Vinal (L/R) discuss with Fisher extensive flight testing with Champions. Veterans of 22 years with Pan American World Airways, the two captains are responsible for all Miami test flights for the "World's Most Experienced Airline."

Another in a series on the care taken by leading airlines to maintain top flight efficiency—and why this care has led them to select CHAMPION SPARK PLUGS. Noted aviation authority reports on Pan American World Airways . . .

"World's Most Experienced Airline"

by **HERB FISHER**

international aviation authority, veteran test pilot, and author

HERB FISHER

Just Over the Horizon . . .

Crowning the gigantic Pan American World Airways Maintenance and Overhaul base at Miami International Airport—like a royal crest of honor over this gateway to Central and South America—are these brilliantly lighted words: "World's Most Experienced Airline."

No airline slogan has commanded more unqualified global respect. Since the maiden flight of its Jenny-type Fokker F-7 tri-motor "Clipper" 30 years ago, Pan American has distinguished itself with a singular history of world-wide aviation development and airline safety.

Pan American pioneered transoceanic routes to South America, Europe and the Orient. Its famous Clippers have flown more than 700,000,000 miles—equivalent to 28,000 trips around the globe. PAA has carried well over 10,000,000 commercial passengers to and from six continents and 82 countries and colonies over the Earth.

Pan American told me it has received more awards than any other airline—tangible testimony to an excellence of performance based on experience in operation and maintenance. In international aviation circles, Pan American has become synonymous with efficiency and safety experience.

Receiving a cordial invitation, I spent several days inside PAA's Miami Overhaul Base (MOB), delving into why Pan American maintains a top position in the air transport industry. This overhaul base occupies 50 acres, 30 under roof, and employs some 2,500 year-round workers. It's the largest airline overhaul plant in the world . . . home base for Pan American's headquartered Latin American Division fleet, serving Central and South America, as well as overhaul center for PAA's Atlantic Division, covering Europe, Africa and the Middle East.

Establishment of MOB in 1948 marked another historic first for Pan American: first time a mass-production, factory-method operation in airline aircraft maintenance had ever been tried. Now, with more than 10,000 engines alone having been overhauled there these past eight years, MOB is an airline industry model.

Each of Pan American's 135 multi-engine aircraft comes in biennially for complete disassembly—Boeing Super Stratocruisers, Douglas DC-4's, DC-6B's, DC-7B's, DC-7C's, Convairs. The whole ship is dismantled and reconditioned from wing panels to cabin carpeting. Engine parts, for example, are chemically and mechanically cleaned until not a vestige of dust or baked-on carbon remains. Parts are then minutely examined with the most modern inspection equipment to insure their soundness and suitability for reuse. Throughout reassembly stages, each unit is tested for operational perfection.

Like ships of sea, giant Clippers of Pan American, too, must come in for a "dry docking" to insure maximum public safety. They're completely disassembled and reconditioned. A special 75-ton dock of movable and stationary sections was designed by PAA to handle this double-deck "Strato" Clipper, largest commercial airliner in operation.

Self-explanatory are these safety reminders, which Fisher observed throughout the Miami Overhaul Base. Maximum safety efforts from the ground up — up to the stars — put teeth in the slogan, "World's Most Experienced Airline."

Veteran pilots and crew members get constant refresher courses to keep them at peak efficiency. They're required to spend many hours in this "flight simulator," a classroom cockpit duplicating flight conditions.

. . . But, in the Beginning . . .

"World's Most Experienced Airline". . .

a special report for Champion Spark Plug Company

A look at the immediate future with a nostalgic glimpse into the pioneer past is provided by these two Clippers, the pride of their respective eras. Representative of *Tomorrow's* Clipper is this Douglas DC-8 jet. Pan American's jet Clipper fleet—Boeing 707's and DC-8's—is scheduled for service in 1959 and will transport up to 150 passengers per plane at speeds around 600 mph. *Yesteryear's* Clipper, this Sikorsky S-40, was the first PAA plane to bear the now-famous "Clipper" title . . . also the world's first four-engine commercial seaplane. It was delivered to Pan American 26 years ago.

Finally, the completely reconditioned engine is tested on one of Pan American's giant engine test stands for multiple assurance of functional perfection.

Engine Overhaul at MOB occupies a seven-acre building, where up to 300 engines per month can be completely reconditioned. Ignition system overhaul is done in the Accessory Overhaul building, a structure almost as large as Engine Overhaul.

As a pilot, you're not long in the driver's seat behind an engine before you realize the heart of a powerplant is its ignition system. Having spent more than 12,000 hours aloft behind hundreds of engines, I was most anxious to inspect Pan American's Ignition Overhaul. Here, Pan American reconditions everything from magnetos to spark plugs.

The spark plug, of course, is the vital powerplant life-giver upon which all other plane parts are dependent to stay aloft and safely power millions of passengers millions of miles through all kinds of atmospheric conditions.

As I observed installation of spark plugs in the many types of overhauled engines, the very capable manager of MOB, Santos Ceyanes, explained: "We've used Champion Spark Plugs for years. Occasionally we test other plugs, but we always return to Champions. We fly Champions an average of 350 hours between removals. We've never found a better spark plug, and we've tested them all, extensively. Reliability and performance dictate Champions as our necessary choice. Long life, service and economy bolster those vital requisites of choice."

In selecting a spark plug for an aircraft engine, the engine manufacturer first runs exhaustive tests to determine what plug best meets heat-rating and other operational requirements of the engine, William W. McClintock, powerplant engineering superintendent, told me. Then, a limited quantity of the appropriate plug is released to the airline for flight evaluation. A history of the plug's characteristics—performance, reliability, gap erosion, total life, ease of reconditioning, etc.—is recorded throughout testing. Spark plug histories are carefully compared with those from tests of other spark plugs.

"Champions have surpassed other plugs in these tests since we began using Champions in 1943," Mr. McClintock said. "We find, for example, that Champions give us less lead fouling and electrode erosion while maintaining excellent ceramic stability. MOB-overhauled engines have accumulated millions of high-efficiency hours while using Champions."

As powerplant engineering installation supervisor, Morton H. Woolf heads the engineering staff charged with evaluating ignition system test results. With cold objectivity, then, he selects Champions.

Handy with a tape recorder, Fisher talks to Santos Ceyanes, manager of the Pan American Miami Overhaul Base, about the magnitude of overhaul and maintenance that has contributed to PAA's well-earned safety slogan, "World's Most Experienced Airline."

Douglas A. Shropshire (L), Champion aviation representative, gives technical assistance to (L/R) G. F. Sheppard, an Electronics general foreman, and Clyde Walkup, assistant Ignition Overhaul foreman.

When engines have been reconditioned right down to the last nut, bolt and spark plug, they're reassembled and tested in this Engine Test Cell.

An extra safety precaution is taken by Flight Engineer W. F. Kellegrew, a 15-year Pan American veteran who takes nothing for granted: he double-checks his wing-tank fuel supply preparatory to taking off for Latin America. Airborne, he feels secure behind engines equipped with Champion Spark Plugs.

According to L. R. Sayre, a 27-year Pan American veteran and assistant service superintendent, the calculated decision to use Champions has been remade every year since the original decision 14 years ago.

Henry Mossberger, powerplant engineer directly responsible for ignition engineering problems, told me how the Champion Spark Plug Company has "given every cooperation and assistance" in extending the spark plug lifetime sufficiently beyond that of other plugs, providing the ideal combination of plug economy and reliable performance. "After hours of exhaustive extended-life service tests, we find the die-hard Champion without equal."

At this point, I had been thoroughly checked out in the operation of PAA's massive Miami Overhaul Base by an efficient staff. I'd seen the great Clippers of the "World's Most Experienced Airline" disassembled and reconditioned right down to the last spark plug.

And, in the end, I know—being an old test pilot myself—that it is the pilot himself who has the real throttle-hand appreciation of the engine. Capt. Richard Vinal, assistant chief pilot, technical, and a 22-year PAA veteran, confirmed my feeling: "I run flight tests, demonstration flights and performance checks. In these, we've used Champions for many years. They're unequaled. Herb, I use them in my car—and even in my lawn mower."

Capt. Frank M. Briggs, Latin American Division chief pilot, added: "In my 22 years with Pan American, I've logged more than 16,000 hours—mostly on Champions. Everyone knows the high safety record Pan American has, and, quite naturally, we've guaranteed this safety experience to the public with use of the best possible parts and equipment. Herb, I feel very strongly about the success we've had with Champions."

Over-all, the importance of a vendor's cooperation, and Champion's in particular, was summed up by R. D. Charles, MOB assistant superintendent of overhaul and a 27-year PAA veteran: "Champion's close cooperation and efforts to constantly improve the product—new insulators, for example, and lighter type construction, incorporating the best materials—point up the fact that we are using one of the finest products in the field."

Wherever I went and with whomever I talked there at MOB, the reasons for using Champions became increasingly obvious. Service, reliability, long life and economy seem to sum up Pan American's reasons for unanimous Champion preference.

—by HERBERT O. FISHER

Discussing engineering tests are (L/R) William W. McClintock, Powerplant Engineering superintendent; M. H. Woolf, Powerplant Installation Engineering supervisor; Fisher; and H. I. Mossberger, Powerplant engineer.

"Champion's close cooperation and efforts to constantly improve their product point up the fact that we're receiving the finest spark plug in the field," R. D. Charles, assistant Overhaul superintendent and a 27-year PAA veteran, tells Fisher.

A. S. Galbraith, Division Supply Manager, LAD-PAA: "Cost, quality and service life determine product selection. All three factors apply to Champions."

SPOTLIGHT

Navy development of the Pratt & Whitney J52 engine will continue despite cancellation of the Douglas A4D-3 attack plane. Latter was the only military application definitely slated for the new powerplant, but the Navy expects to use the twin-spool turbojet in an advanced attack plane now in the design competition stage. P&W also hopes for small-medium commercial jet transport applications.

Pentagon economy wave could cancel or postpone the Army's plans to develop a flying crane of eight to twelve tons' capacity. Several companies are working on design studies, but the soldiers are taking a hard new look at the project from a cost standpoint. They don't want to start a project and then have to cancel it later for lack of funds.

A single T53 or T58 turboshaft engine may replace the four small piston engines originally scheduled for Fairchild's VTOL testbed project. Work on the Army-financed deflected-slipstream aircraft has been suspended because windtunnel results failed to measure up to advance calculations, but Fairchild is confident the project will get a go-ahead.

Convair Terrier missile is a radar beam rider and uses Sperry's new dual beam radar that combines both tracking and capture beams. This advance in radar technology dispenses with past "collimation" problem in Nike guidance of lining up relationship of two radars. Missile finds "capture" beam and follows it to target.

PAC Aero Engineering Corp., Santa Monica, will re-engine a Convair 440 bought by D. Napier & Son. Eland engines will be installed soon after the aircraft comes off Convair line next month.

A DeHavilland Comet with production-type Rolls-Royce jet silencers on its Avon engines is due to fly soon.

Airline feeling is that nothing should be done now by ICAO to set system standards for single sideband radio communication because there are too many unknowns. Aeronautical Radio Inc. is dropping formal arguments for the time being but will inaugurate inservice tests on 1-2 frequencies in New York State using Collins and Kahn equipment.

The Army has asked the Air Force and Navy for expressions of interest in the development of a turboshaft engine of 250 horsepower. The service that is willing to kick in the most assistance will probably be selected for the job.

Sud-Aviation will complete its first production Caravelle jet transport early in 1958. Production will get into high gear in 1959 when a total of 15 will be delivered. Starting in 1960, production of the French jet will increase to four aircraft per month.

Westland Aircraft has started delivery of a quantity of license-built Whirlwind Mark 7 (S-55) helicopters to the Royal Navy for anti-submarine duties.

Vickers Viscount airline flight hours are now past the 600,000 mark.

Fourth Navaho test-launching last month was considered "best" to date. Booster fired for 42 seconds, then cut off for reasons unknown. Ramjets failed to ignite and missile fell into sea.

Fiat has incorporated the lessons learned from the crash of the first G.91 in the third prototype of the lightweight fighter. The first model's crash has been officially ascribed to anti-symetric tail flutter intentionally originated during a test maneuver.

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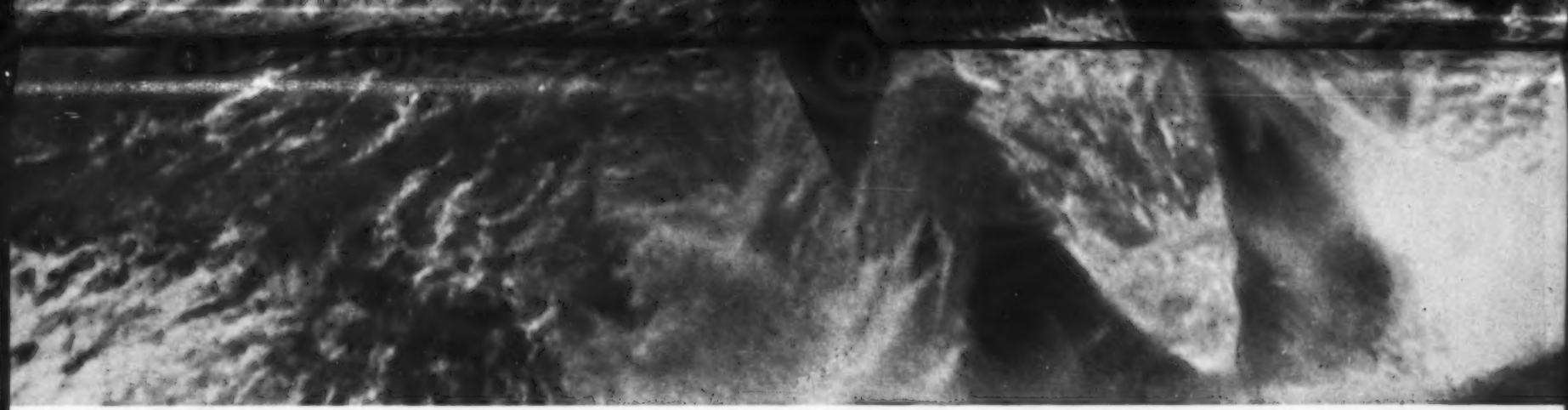

New might for the U.S. Navy: nuclear-powered submarines armed with long-range missiles

THE MOST POWERFUL NAVAL GUNS KNOWN HAVE A RANGE OF LESS THAN 25 MILES. THE "POLARIS" MISSILE, FOR WHICH LOCKHEED HAS PRIME RESPONSIBILITY, WILL EXTEND THE FIREPOWER OF THE U. S. NAVY TO TARGETS 1,500 MILES DISTANT -- AND HIT THEM WITH A NUCLEAR WALLOP.

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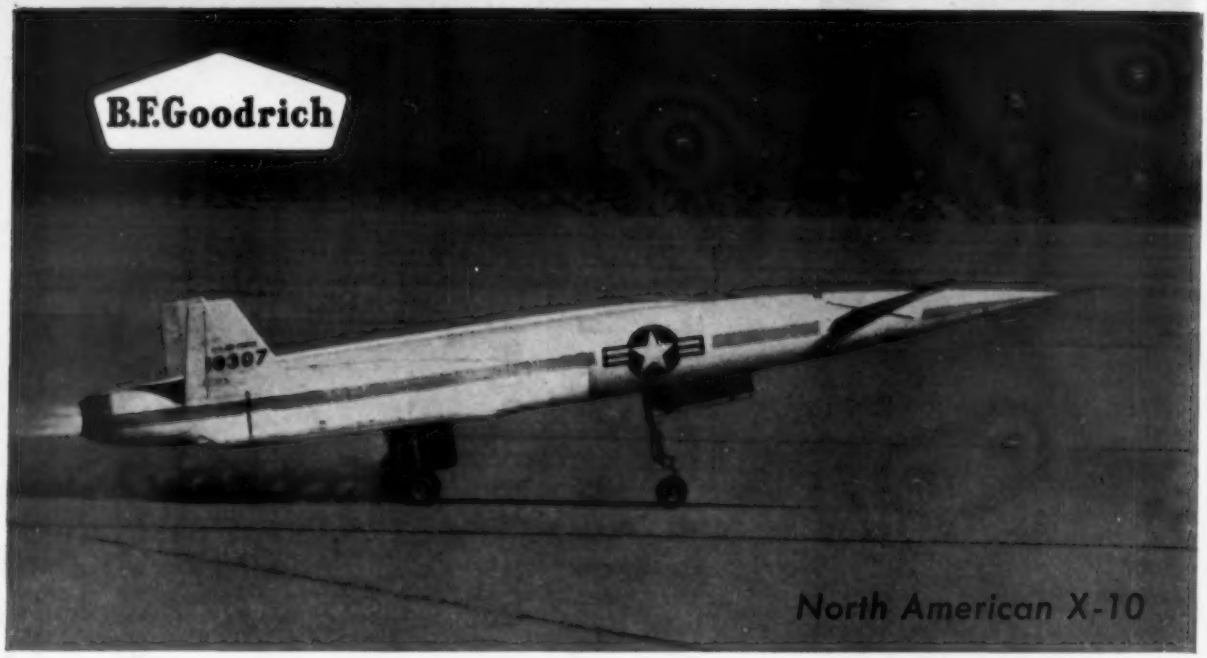
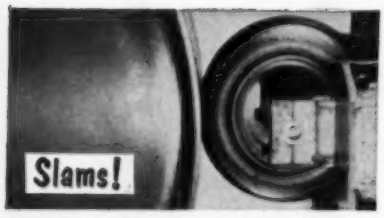


B. F. Goodrich tires land at 250 mph– with strength to spare



B. F. Goodrich high-speed tire slams into giant dynamometer wheel revolving at 300 miles per hour.

Impact, friction and centrifugal force temporarily deform tire into series of standing waves. But . . .

High-speed tire withstands this punishment, makes repeated "landings" without failure.

North American's X-10 plays a vital part in development of the SM-64 Navaho intercontinental supersonic, strategic guided missile. When this unmanned test vehicle screams onto the landing strip, exceptional requirements must be met by landing gear components.

For maximum safety, the main landing gear of the X-10 is equipped with B.F.Goodrich tires, wheels and brakes. The special high-speed BFG tires are inflated to 250 pounds per square inch to withstand the overload of landing impact. Special tread rubber compound resists heat build-up during 250 mph landings and take-offs, assures proper transmission of braking power to bring the X-10 to a safe stop.

But this spectacular performance of the B.F.Goodrich high-speed tire is well within its limits. Extensive dynamometer tests prove that this tire can handle the heat and impact of a 300 mph landing (photos at left). This kind of punishment would tear an ordinary tire to pieces, but the new B. F. Goodrich tire stands up to the destructive treatment without failing.

Of course, you may not require such unusual performance from a tire. But designing a tire like this means that B.F.Goodrich engineers can make better tires for conventional aviation use.

You can profit from the lessons learned in the laboratory and on the X-10. Specify B.F.Goodrich tires, tubeless or tube-type, for military, commercial or business planes. For specific information, contact: B.F.Goodrich Aviation Products, a division of The B.F.Goodrich Company, Akron, Ohio.

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AMERICAN AVIATION

WORLD'S LARGEST AVIATION PUBLISHERS

Navy faces up . . .

Past spending cuts have paved the way for new Defense budget squeeze: SeaMaster, A4D-3 and W2V-1 programs are first to feel dollar pinch

by Lois C. Philmus

NAVY is reacting to the Defense spending ceiling and tight dollar with a calmer mien than the Air Force—mainly because it is more conditioned to program reductions.

The Navy has already formulated a weeding-out process because of budget slashes over the past few fiscal years. Its basic policy of reducing the required minimum of basic models in inventory is established and moving. Its overall program was put in lower gear about two years ago, whereas USAF must now begin shifting.

But while the mien is calmer, the reprogramming is no less intensive. Navy will have to make some reductions, although apparently not as severe as those facing its sister service.

"There is every indication that if the current expression of level budget spending is maintained, the military establishment will suffer reduction in number of units," Vice Adm. William V. Davis, Jr., Deputy Chief of Naval Operations (Air) told AMERICAN AVIATION in an exclusive interview. "These reductions must be compensated for by an increase in effectiveness, with choice made between what goes into new production and keeping the required minimum strength."

The spending ceiling, he pointed out, adds up to simple arithmetic: a balance between the maximum required introduction of the latest development and ability to meet the minimum required numbers of units with funds on hand.

Under the tight dollar situation, compromise must be effected in the number of new front line aircraft types, the Navy official acknowledged. But, he warned, the decrease must be compensated for by increasing maintenance spending for modification and overhaul to keep existing aircraft at superior performance level. New developments must represent large strides forward to reach the procurement stage, not just be a little bit better, he added.

Navy is not contemplating any stretchouts at the present time. Stretchouts, he said, too often cost more money rather than effect any savings. However, if a lower spending ceiling is imposed at a later date, stretchouts would be necessary, although no areas are yet specified.

Navy estimates, however, that its fiscal 1958 airplane shopping list will have to be reduced from 1,220 to 1,095 under proposed House cuts. Other reductions are expected. Adm. Davis said, from price increases which occurred since the list was first priced out last year for Congressional submission. In actual deliveries, the Navy expects about a 25% reduction in fiscal 1959 from the estimated 2,000 plane deliveries scheduled for the new fiscal year.

Two programs canceled

But the increasingly tight dollar has recently resulted in Navy's canceling two major programs and cutting production on a third:

Six of the 24 production SeaMasters on order were canceled because of the delay in the flight test program. Redesign costs, increased overhead resulting from the stretchout and higher cost of the ground support equipment all teamed up to force the cutback. Original SeaMaster program included the two test models which were destroyed, six YP6M-1 developmental models which remain in tact, and the production order.

Adm. Arleigh Burke, Chief of Naval Operations, reported to Congress that the SeaMaster program has already used up $93 million of the $228 million obligated through April 30. Further production orders will be decided on the basis of the results of the flight test program with the six developmental models.

Douglas A4D-3 carrier attack plane program was canceled. Contract

Navy's new ASW seaplane concept

Two prototypes of the new Navy anti-submarine warfare seaplane are in the fiscal 1958 shopping list, AMERICAN AVIATION has learned. Design specification negotiations with Convair are concluded and a pre-production contract will be signed as soon as funds are available. The new ASW will feature:

Tri-motor configuration, using three piston engines in the 1800-2000 hp class.

A high-dead rise hull for extreme rough water operation.

STOL capability for limited water area operations.

The new ASW will replace the old P5M in the early 1960s. Its concept involves operations from places where current seaplanes cannot operate due to sea, sea-room and weather limitations. Armament will include conventional as well as advanced ASW weapons. Equipment will be packaged into an ASW tactical system, representing a great improvement over current aircraft.

"Complete operability in all weather conditions and sea states may not be achieved in the first concept," Vice Adm. William Davis, Jr. says, "but it remains a goal to be achieved. The currently contemplated step, however, will immensely increase our operational capabilities in previously unuseable waterways. There are of course additional advantages increased in safety of the STOL seaplane in crowded waters or from danger of floating debris. This plane could rightfully be called an open ocean seaplane, as only severe storm conditions would preclude its operation anywhere."

called for four evaluation models. It was not sufficiently better than existing aircraft, Adm. Davis explained. It was a reasonable improvement rather than a dramatic development. Pivotal factors forcing cancellation were cost and determination of the growth potential of the A4D-2. (Cancellation is not expected to hurt the P&W J52 engine development program. Other military applications will keep it going.)

Preproduction engineering phase of Lockheed's W2V-1 turboprop picket plane plane development also was canceled, but the Phase I portion of the contract leading to mockup will be continued. It includes development studies and windtunnel tests, as well as fuselage mockup.

On the other hand, the admiral vigorously denied that the McDonnell F4H will be canceled shortly in favor of the Chance Vought F8U-3. Economic, as well as military necessity, he said, dictates continuance of the two aircraft through the stages of development and evaluation which will allow a competent decision. "Present intention is to make the best use of money already invested in both programs. Ideally, the decision should be based on purely military grounds as to whether one or both would be carried into fleet operations. However, economic considerations will require a choice." Both planes are scheduled to begin flight test programs early next spring.

"Stage of determination is reached fairly early in the flight test program," Adm. Davis pointed out. Based on this, Navy should be able to reach a decision in early 1959. Comparative evaluation will be based on: military usage value, cost, upkeep and maintenance requirements, and growth potential.

"If both planes come out without serious differences and with parallel performance, the decision will be hard," the Navy airman noted, adding: "But this seldom occurs."

High on the Navy's manned aircraft priority list is a requirement for a new anti-submarine water-based aircraft (see box for details). Negotiations with Convair on design specifications were recently concluded. A development contract leading through detailed pre-production planning and mockup will be signed as soon as new money is available.

Interest in a new COD (carrier-on-deck) transport (AMERICAN AVIATION, May 6, p. 25) is increasing. Need for a new, higher capacity aircraft has been emphasized because of the new single manager logistic airlift assignment. "Logistic capability under the direct control of the fleet commander for shore to ship airlift must be expanded to meet fleet requirements," Adm. Davis said.

No formal program has been drawn up, but intensive informal studies of designs and modifications to existing aircraft are underway. A small quantity of CODs may well appear in the fiscal 1959 shopping list.

With a comparatively firm missile program, Navy (as are the other services) is waiting for results of a particularly intensive Defense study of all military missile developments. Two priority programs—the Regulus II and Corvus air-to-ground missile—are currently unimpaired and expected to remain intact.

However, Adm. Davis admits that a decision on Triton (long-range, air-breathing missile development) will come soon as part of the overall Defense study. The program is still in early development stages and no large scale spending is contemplated until the concept is evaluated.

VICE ADM. WILLIAM H. DAVIS, JR.

Decision on Triton, like the Air Force's Navaho, is closely tied to a timing evaluation on ballistic missiles. It also is implicated in a feeling in some areas that, after all, air-breathing missiles may have more advantages than the top priority ballistic weapons.

Without taking sides, the admiral did note that at the present state of the art "the air-breathing missile appears to offer greater precision or accuracy of delivery plus being of smaller size" than the big ones. "It boils down to a concept of oversized bullets vs. undersized planes, with cost ending up pretty closely comparable," he added.

Navy's general attitude is that it will tailor its programs to get the most effective force out of what Congress doles out to them.

Davis' reaction to accusations in some areas that Navy is not fighting hard enough for more budget:

"It's mostly love's labor lost." Navy, he said, carefully studies and develops a program that can come under the closest scrutiny. Congress is armed with this knowledge but also has complete knowledge of the state of the economy.

"Nothing said or done can change the result because Congress knows from the beginning what the Budget will stand. Our job is to ask but when the decisions are made, all we can do is our best."

Generally speaking, the Navy may be expected to follow the same course as the Air Force in its effort to cut costs as far as possible without actually losing aircraft and missile hardware.

More vigorous efforts to control overhead costs are likely. Navy procurement officials will probably take a closer look at the engineering departments of BuAer contractors to make sure the method of quality engineering is employed rather than quantity engineering.

Like the Air Force the Navy must also restrict its overtime payments to contractors. It will push for cuts in contractors' personnel, and will surely resist applications by contractors for greater executive rewards.

It will expect its prime contractors to negotiate the lowest possible prices from subcontractors, and it will certainly take a tougher stand on facilities requests by contractors.

Rather than across the board cuts, Navy is concentrating on individual projects. Each development and procurement program is being studied separately to see where costs can be cut—in more of a custom-tailored operation than that of the Air Force.

At press time, Navy was optimistic that the "meat and bones" of the House procurement cuts would be restored. As one Navy man quipped, "we've got programs for everyday in the week," and so it is more resigned to the inevitable reductions than the airmen.

Adm. Davis details "pet peeves"

"The most annoying facet of today's Defense economy," Vice Adm. William Davis recently told an Aero Club of Washington meeting," is the constant harping that the military should use sound business practices." This concept, he exploded, is being accepted as established fact!

In a slap at some industry practices, he said he would be delighted to have the funds to "sponsor cute moppets on nationwide TV shows and pad expense accounts."

In a more serious vein, he declared that the defense system is a "gigantic enterprise and some mistakes are inevitable. But we have all areas under constant surveillance, using outside consultants when necessary. When soft spots are found, they are immediately corrected . . . Where economies can be pinpointed we immediately jump on them."

His second pet peeve is the constant push to force the military into contracting all its major functions. "We will not conduct the Navy by contract," he asserted. "We must maintain a fighting force independent of the civilian economy."

Probers issue warning on Defense buying practices

House subcommittee says Pentagon must return to policy of advertised bidding, remove secrecy surrounding government contracting

by Charles Schaeffer

HOUSE PROBERS have delivered a stinging indictment against Pentagon handling of negotiated procurement. In a scathing report, the Hebert Armed Services Investigations Subcommittee roundly blasted military buying practices, called for instant reforms.

From the House unit's public hearings last Spring and from separate studies came these conclusions:

The Pentagon must return to a policy of advertised bidding on many of the contracts it now negotiates.

It must, moreover, toss off the "cloak of secrecy" surrounding government contracting.

Any other course, the subcommittee asserted, will steer the nation farther away from the "traditional American system of public purchasing."

The subcommittee fumed over discovery that Pentagon chiefs had been invoking a seven-year-old Korean War emergency clause to dodge formal advertising. Issued by President Truman in 1950, the order authorized military buyers to employ negotiated procurement instead of the slower advertised-bid techniques.

Chairman F. Edward Hebert's complaint pivoted on what he said was a broken promise by Defense Department. He claimed service secretaries on Jan. 1, 1956, agreed to limit purchasing under the emergency clause.

"The facts are," Hebert declared, "that in the months following that promise $5,312,000,000 of the $13.5 billion expended was contracted for on the theory that the Korean hostilities still continued."

To avoid perpetuation of this "arrogant abuse" of congressional authority, the subcommittee urged return of the power to declare a national emergency to Congress.

The report charged that about 92% of the nation's procurement is being conducted via negotiations, instead of advertised bidding.

Focusing on the 17 exceptions to the use of advertised bidding in sections 2304 (a) of chapter 137 of the procurement rules, the subcommittee further urged:

Rewriting of a clause that now allows negotiated contracting when it is "impracticable" to obtain competition. The subcommittee would sanction the procedure only where "no competition exists, or where the prices for such products or services are fixed by law."

Prompt publication of all bid proposals after the award of a contract under negotiation as is now done under advertised procedures. Any accepted bid higher than the lowest proposal would be accompanied by a written justification.

Adoption of a new, clearer definition of the term "negotiation."

Institution of a uniform set of procurement rules for the three services.

A shake-up of the personnel responsible for pre-award surveys of facilities and firms considered as military contractors.

The report lashed out at closed-door government procurement activities. "Secrecy of negotiation is the spawning ground for suspicion and fraud . . . the negation of a public trust openly administered," the subcommittee declared.

Probers revived complaints and testimony of manufacturers who had sought the committee's relief. They recounted the case of Keco Industries, Inc., which lost a $2,000,000 aircraft air-conditioning contract (AMERICAN AVIATION, March 11, p. 27).

Hebert signaled the release of the report at a conference with the press. He flatly termed the lop-sided volume of dollars obligated under negotiation as the "crux" of the problem.

Figures cited by the subcommittee disclosed that the Pentagon invoked the Korean emergency clause in spending $5,312,515,000 of $13,642,796,000 in defense items during the first nine months of 1956.

Defense spent $2,999,220,000, or 21%, of this total on purchases "requiring substantial initial investment." The Louisiana Democrat said: "The government has put or kept these firms in business."

Simultaneously, the Pentagon completed 2,835,801 contracting "actions" under negotiation—83.14% of which paid for purchases under $1,000. Of these 54,445 represented the number of times it was "impracticable" to use advertising.

A table, published by the subcommittee, shows this breakdown of negotiated vs. advertised procurement from Jan. 1 to Sept. 30, 1956 (below).

The subcommittee ignored Pentagon pleas to leave procurement rules unmolested. "The cry that section 2304 (a) (1) should not be changed because of the need for additional standby power . . . in an emergency has served to abuse the confidence of Congress and flout the law," the subcommittee said.

"There are ample provisions for emergency contained in the First War Powers Act, if indeed the public exigency provision of the Armed Services Procurement Act . . . is not adequate for that purpose."

Details of a trial-balloon two-phase method of advertised buying were bared in the report. Under the experiment, the Air Force will call for evaluation of technical proposals from firms, but avoid initial price discussions. Later, costs will be solicited by AMC from those firms turning in acceptable proposals.

Air Force doubts, however, crept into its own report to the subcommittee. No less than 12 problems will be created or aggravated by new emphasis on advertised bidding, the AF indicated.

It paid special heed to the expected squawks from contractors who may be denied negotiation session—if they file unacceptable technical outlines. The Air Force raised the ogre of drawn-out procurements; and it warned, finally, that it must shift to negotiation when only one acceptable proposal is submitted.

Negotiated procurement vs advertised competitive bidding
Jan. 1, 1956, through Sept. 30, 1956

Service	Total Dollars (000)	Dollar Amount Negotiated (000)	Dollar Amount Advertised (000)	Dollar Percent Negotiated %	Dollar Percent Advertised %
Army	$2,647,590	$2,203,466	$444,124	83.23	16.77
Navy	4,145,529	3,768,280	377,249	90.90	9.10
Air Force	7,034,713	6,744,359	290,354	95.87	4.13
Total	$13,827,832	$12,716,085	$1,111,727	91.96	8.04

Advanced Matadors add punch to USAFE wing

by Henry T. Simmons

WHEELUS AFB, Tripoli—The Air Force's 701st Tactical Missile Wing in Europe has completely switched from the TM-61A Matador to the TM-61C, which features a dual guidance system, and it expects to receive the still more advanced TM-61B in the future.

This was reported by Col. Robert F. Zachmann, Deputy Commander of the 701st, in a Matador briefing staged here for visiting U.S. newsmen last month. A test firing of one of the improved Matadors was also conducted at the Air Force's missile launching site 17 miles east of Wheelus and extending into the Libyan Desert.

MARTIN TM-61C Matador missile is kicked off on a 225-mile test flight into the Libyan Desert. The Libyan firing range is used by units of the Air Force's 701st Tactical Missile Wing, presently stationed in Germany.

Zachmann said the Matador can carry a maximum payload of 3,000 pounds to targets more than 600 miles distant. Powered by an Allison J33 turbojet engine of 4,600 pounds thrust, plus a Thiokol booster which can produce 52,000 pounds of thrust for two seconds, the Matador can achieve high subsonic speeds and altitudes in excess of 35,000 feet, Zachmann said.

The original Martin TM-61A was equipped with the MSQ radar guidance system which was first used in Korea to direct fighter-bomber strikes on enemy targets at night or in overcast conditions. The MSQ system requires a network of ground radar stations to keep the missile under continuous surveillance and to provide course and position data. Its positive control extends only as far as the direct line-of-sight, with a ground controller providing manual direction for the missile.

The TM-61C used by the 701st is equipped with a second guidance system in addition to MSQ. This is known as "Shanicle" and is believed to utilize the hyperbolic grid principle of guidance.

A hyperbolic grid system involves the creation of a grid pattern of radio waves by two or more radio transmitters located in separate positions. Unlike radar, which is limited to line-of-sight, a radio grid may be broadcast for several hundred miles. The missile could be programmed in advance to follow a certain sequence of augmented and diminished radio impulses directly to the target without the necessity for manual control by a human operator, as required by MSQ.

Last January, the 701st Tactical Missile Wing conducted Exercise Smite in the European theater "to see if the Shanicle system could live in the electronic environment of Europe," Zachmann said. "I might add that this test was very successful."

The 701st is part of the Twelfth Air Force headquartered at Ramstein, Germany. The wing itself is split into three groups which are stationed at Bitburg Air Base, Sembach Air Base and Hahn Air Base, all in Germany. Each group consists of a squadron which actually prepares and launches the missile, plus a guidance and communication squadron and a support squadron. Each firing squadron consists of six launchers and twelve launching teams, giving the wing a total force of 18 launchers and 36 launching teams.

The Air Force has developed an ingenious system for maintaining the combat proficiency of the 701st without frequent firings of the $100,000 Martin missiles. The wing has been assigned a number of Lockheed T-33 jet trainers with MSQ guidance equipment installed. The aircraft simulate Matador firings on a daily schedule, sometimes performing two or three missile runs per flight. The pilot flies in response to visual and audio signals transmitted by the ground controller. These include course instruction as well as warhead arming, pre-dumping and simulated dumping on target.

Since some actual firing is necessary, if only to test the combat proficiency of the launching teams, the Air Force has established a Matador firing range in the Libyan Desert. It plans for each of the 701st launching teams to conduct one actual missile firing a year at the Libyan range.

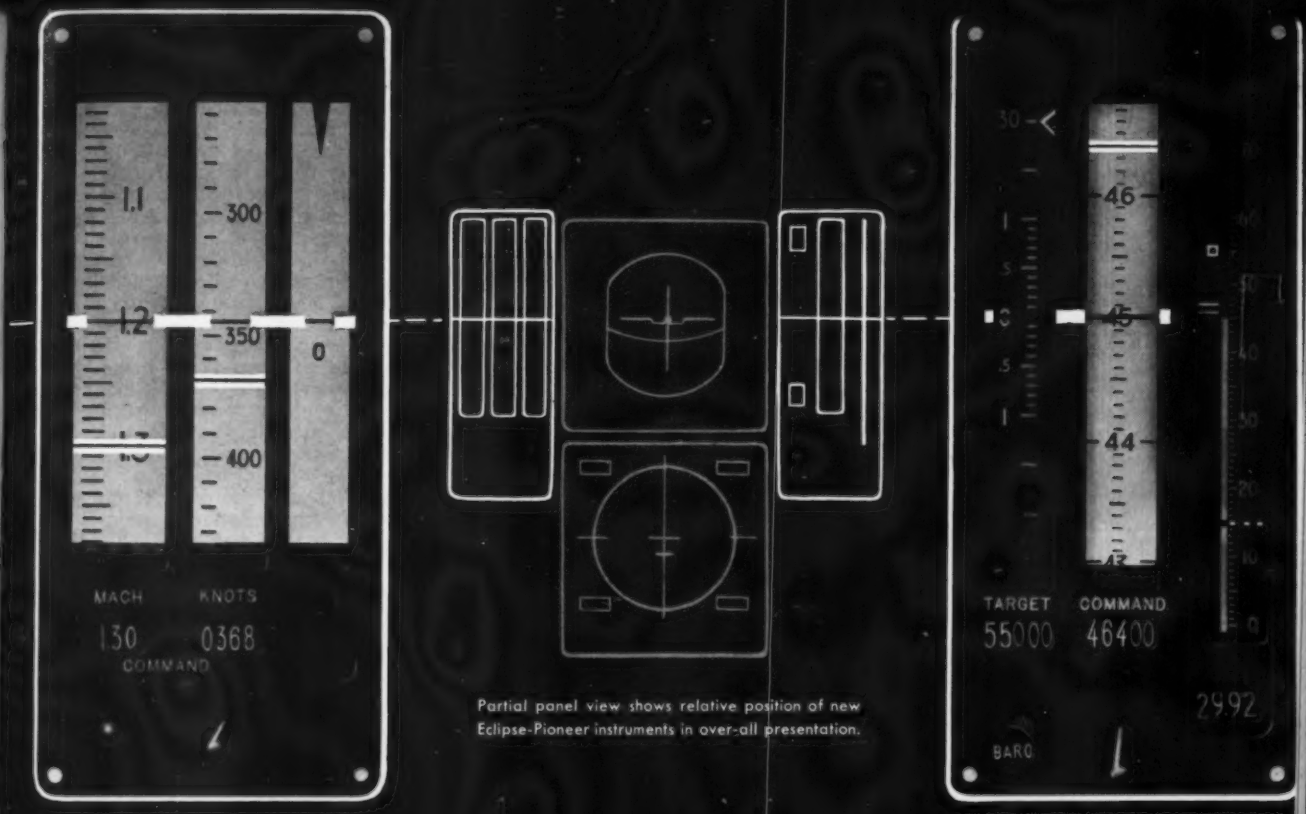
Newsmen witnessed a typical firing at the Libyan range in mid-June. A formal count-down procedure was used during the operation, with the start of the jet engine coming about X minus four minutes. For the last minute of the count-down, the engine was operated at full power, and then the missile was kicked off by the powerful booster rocket. Though the booster fired for only two seconds, it was sufficient to accelerate the missile to a speed of 180 knots.

The missile was directed along a dog-leg course east and then south to a point about 225 miles into the interior of Libya where an impact area of 10 miles' diameter had been established. The test vehicle carried about 3,000 pounds of concrete in its nose in place of an explosive warhead.

Tripoli base is center of proficiency training

EL UITIA FIELD, LIBYA—(Special)—One of the most important activities conducted by the Air Force at its Wheelus Base in Tripoli is weapons proficiency training for combat units stationed in Europe. The very large extent of these training operations was disclosed to U.S. newsmen who visited Wheelus in mid-June as guests of the Air Force.

Some 85 miles south-west of Wheelus in the Libyan Desert is El Uitia (pronounced Watia). A 15-man detachment at this small outpost maintains ground targets and scores bombing and strafing runs by the squadrons of fighter-bombers and tactical bombers rotated every six months from Europe. Newsmen were flown by Vertol H-21 helicopters to the El Uitia



Partial panel view shows relative position of new Eclipse-Pioneer instruments in over-all presentation.

NEW INSTRUMENTATION SIMPLIFIES JET PILOT'S JOB

Easy-to-read moving-tape command concept is first step in Air Force program to ease burden on pilots

The jet pilot's job is made easier by a new reference line concept in instrument presentation developed jointly by the Flight Control Laboratory, Wright Air Development Center and Eclipse-Pioneer. This new presentation—designed to operate from a Bendix Central Air Data Computer—employs moving tapes in two vertically mounted instruments to tell the pilot at a glance "what is happening" and "what needs to be done".

Complex mental computations are eliminated. Actual and desired flight information is presented in easy-to-read, graphic fashion. *Actual* flight information is displayed on moving tapes against a common, horizontal reference line. Command indications are shown by the black and white bars. Direction of the moving elements corresponds with the control forces. When the command bars coincide with the horizontal reference line, desired performance is attained.

Suppose for a moment you're a jet pilot. To know what you're doing you read across the common horizontal reference line. The instrument at left shows you are flying at Mach 1.2—345 knots indicated.

Your glance continues to the instrument at right. You note an indicated altitude of 45,000 feet. Additionally, the left scale of this instrument shows a 30,000 f.p.m. rate of climb, while the column at far right indicates target altitude—55,000 feet; command altitude—46,400 feet; and cabin pressurization—15,000 feet.

The black and white command bar tell you what needs to be done. Th striped bar at the bottom left is th maximum safe Mach marker.

Far-reaching results are foreseen for thi simplified presentation. By reducin "head in cockpit" time, greater safet is achieved and chances of flight missio success greatly improved. Training time too, is reduced.

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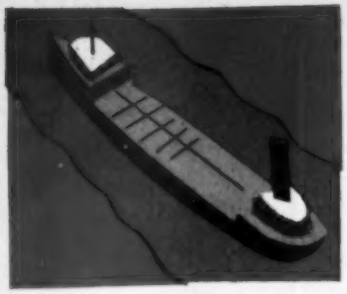

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outpost to witness high angle bombing, toss bombing and over-the-shoulder bombing as well as strafing by North American F-100D's and F-86F's.

El Uitia is part of the 7272nd Aircraft Gunnery Group of Wheelus commanded by Col. Robin Olds. The gunnery group maintains three other ranges, including two over-water ranges off the coast of Libya for proficiency training of all-weather interceptors and day fighters and the missile firing range which extends approximately 200 miles south into the Libyan Desert.

The gunnery group's normal training load is four tactical squadrons on a rotational basis. These usually consist of two fighter-bomber squadrons, one fighter-interceptor unit, one day fighter unit, and on less frequent occasions, a tactical missile unit or a squadron of Martin Matador missiles. Units normally change each weekend, with a new one arriving for a 30-day course just as an old one leaves.

As in the United States, the all-weather interceptors fly their missions against towed targets and rely exclusively upon radar guidance. They are vectored into the vicinity of the targets by ground radar, and then rely upon their own airborne radar for final lock-on and firing of their 2.75-inch FFAR rockets. The cockpits of the interceptors are hooded so that the pilots cannot see their targets and they are accompanied by chase planes to prevent inadvertent firing at the tow aircraft.

The 7272nd Aircraft Gunnery Group runs the ranges, schedules their use among the rotational training squadrons, enforces safety rules, provides instructors, performs all scoring and provides the required munitions. Its inventory of organic aircraft include B-29 and B-57 tow target aircraft, F-86F chase planes, Lockheed T-33's for instrument training and H-21 helicopters for range support.

Despite its important training work, the primary mission of Wheelus is to support strikes by the Strategic Air Command in the event of an all-out nuclear war. It possesses a runway of more than 11,000 feet and a parallel taxi-way of the same length which may be used for take-off in event the runway is put out of commission. For its own protection, it has a squadron of F-86D interceptors parked in alert hangars off the end of the runway, plus a network of radar stations for early warning.

It is the home of the Seventeenth Air Force, commanded by Maj. Gen. Richard O'Keefe. The Seventeenth is one of three numbered Air Forces in the European theater responsible to Lt. Gen. William Tunner, commander of USAF, Europe. It controls military units in Morocco, Libya, Italy, Greece and Turkey, and its area of responsibility includes all these countries as well as Algeria, Tunisia and all the islands of the Mediterranean with the exception of the Balearics.

Wheelus as a major link in the Air Force's vast transport network in Africa, Europe and the Near East, handling more than 50,000 passengers and 30,000,000 pounds of cargo in 1956. It is part of USAFE's Air Logistic Service which operates from Nouasseur, Morocco, and Athens, Greece, and has a monthly capability of 2.5 million ton miles.

All told, the USAF has an investment of more than $550 million in facilities, equipment and supplies in the Mediterranean area. Some 12,000 USAF personnel plus dependents are stationed at 11 major airbases in Libya, Turkey, Saudi Arabia, Greece and Morocco, and the Air Force has entered agreements for the use of 10 more bases on a supplementary basis.

First operational unit gets jet tanker

The 93rd Air Refueling squadron at Castle Air Force Base, Calif., has received the first Boeing KC-135 Jet Stratotanker to go into operational service with the Strategic Air Command. The 600 mph tanker will give SAC's B-52 wings greater range and mobility.

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"Bernie" Fenwick, outside Friendship International Airport's Terminal Building. Directly behind him is a Constellation operated by Eastern Airlines, one of Pan-Maryland's airline customers.

"There's no ceiling on success when you fly with Shell!"

says G. B. Fenwick, Jr., President of Pan-Maryland Airways. P-M boosted its gallonage fiftyfold in six years as a Shell Aviation Dealer at Friendship International Airport, Baltimore

It's no wonder Bernie Fenwick is happy Pan-Maryland teamed up with Shell in April 1951. At that time, one truck was more than enough to handle their business. Three months later, thanks to Shell's help, they began making into-plane deliveries to the airlines.

Today, Pan-Maryland has 13 trucks busy fueling and servicing the airlines, private airplanes, jet fighters of the National Guard, police department aircraft, helicopters, military

and government-owned aircraft and dozens of corporate aircraft.

"We've got an extremely diversified operation here," says Bernie. "Pan-Maryland handles everything from Cubs to F4D Navy jets—from Mites to B-52's.

"Consequently, we handle the complete line of Shell Aviation Fuels, including Shell Turbine Fuels for jet planes and commercial turboprop airplanes.

"Shell also provides us with a full line of AeroShell lubricants, fluids and greases to fit our customers' needs. What's more, we get up-to-date technical advice from our Shell representative who's always at our service."

When Bernie talks about the services Pan-Maryland gives its customers, he emphasizes that delays are almost nonexistent. All pilots have schedules to meet and what they want most of all is fast, efficient, on-schedule service.

A "Customer's Service Report" is mailed to every flier who stops at the field. It invites comments and criticism of service, workmanship and courtesy. Replies like "Best service I've ever gotten—anywhere," "Excellent in every way," "Keep up the good work," are received every week from all over the country.

Bernie points out that their CAA Certified Repair Station is going to be finer than ever. A big new hangar will be completed soon and he plans a Class 4 shop there, with service crews qualified to work on every type of plane.

Other plans for the future include branching out into airline ramp service, setting up an aircraft sales department, building more hangars *and boosting gallonage still further.*

"After all," says Bernie Fenwick, "the sky's the limit with Shell."

Private planes get first-class treatment, too. Every civilian pilot who uses the field receives a "Customer's Service Report" which requests suggestions for improving service.

The Boeing 707 jet transport is fueled by Pan-Maryland with Shell fuel at Friendship International Airport after its recent record 3-hour, 48-minute transcontinental flight.

Bernie discusses plans for future expansion with Col. J. Colonna, Airport Director.

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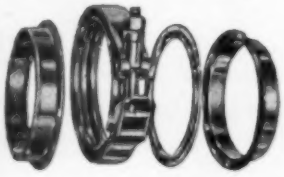

For connection and disconnection of aircraft tubing. Flange ends mate with all-metal gasket to provide positive seal for fluid and gaseous systems up to 2000 psi. in 1" size, at operating temperatures from —300°F. to +1000°F., available in 1" to 12" O.D. tube sizes.

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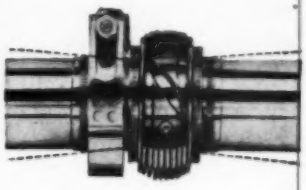
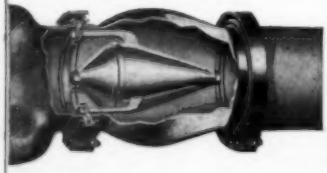


Marman In-Line Check Valves



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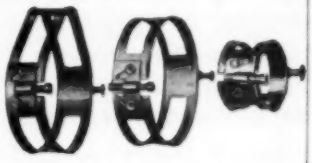
Marman Lightweight Instrument Clamps

For quick, easy installation of instruments and light accessories. Designed with weight savings up to 60% over standard clamps, this AN-approved type is non-magnetic for universal use. In AN 1½", 2" and 3¼" sizes, plus special configurations and sizes.



Marman Band Clamps

For easy connection and support of components and accessories. Marman offers a wide range of clamp types and sizes, with four types of latches: T-bolt, quick-coupler, saddle, or thumb screw. In corrosion-resistant stainless steel and aluminum alloy.

Marman Flexible Couplings

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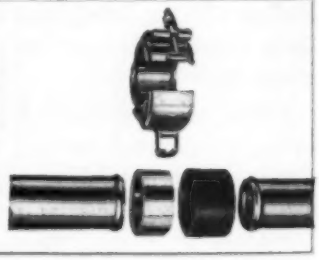

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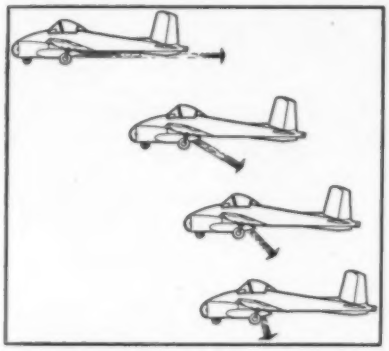
Bell demonstrates jet-powered X-14 VTOL

Bell Aircraft Corp.'s jet-powered VTOL, the X-14, has successfully completed initial flight tests, the Air Force revealed late last month. First hovering flight of the craft occurred last February at the company's Niagara Falls plant.

The X-14 was designed to take off vertically, with the airplane maintaining its horizontal attitude.

Vertical takeoff thrust comes from a jet-engine blast directed through thrust diverters or vanes located behind the X-14's powerplants, two British-made Armstrong-Siddeley jet engines. For transition and forward flight, the pilot re-directs the jet efflux towards the rear of the airplane.



TRANSITION from vertical to horizontal flight is made by rotating jet stream exhaust from its two British engines by means of thrust diverters or vanes.

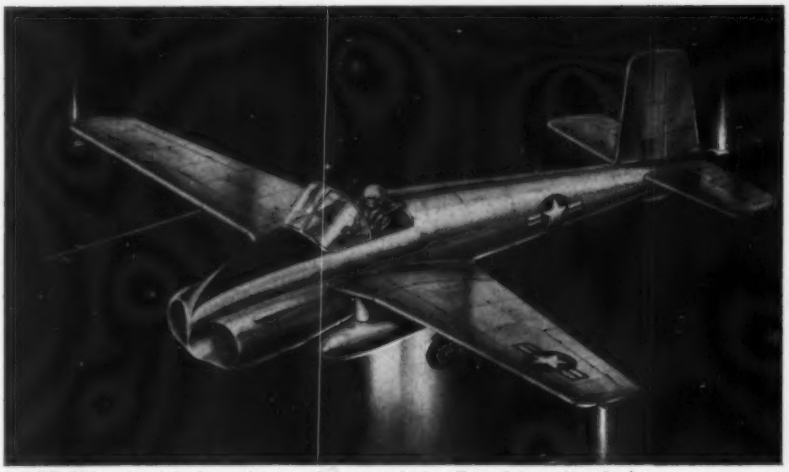
Because fixed-wing aerodynamic surfaces are ineffective during hovering or slow flight speeds, directional control is gained through control nozzles which emit compressed air streams at wing tips and tail.

X-14 dimensions: wing span, 34 ft.; length, 25 ft.; height, 8 ft. at tail.

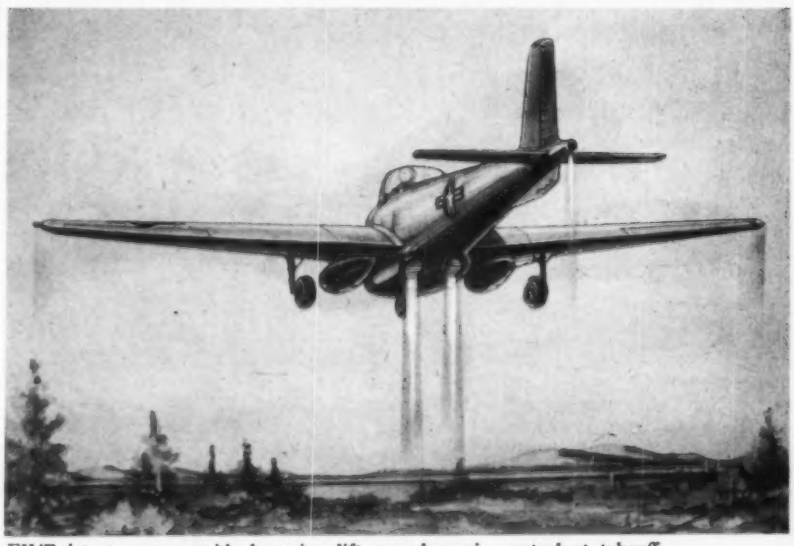
Prototype of the X-14 was developed three years ago when Bell used its own funds to explore the possibility of employing the directed-thrust principle. This program led to an Air Force contract to design and build the present experimental craft.

Bell believes that by applying the directed-thrust principle to military fighters and commercial aircraft, the need for long runways for jet aircraft will be eliminated.

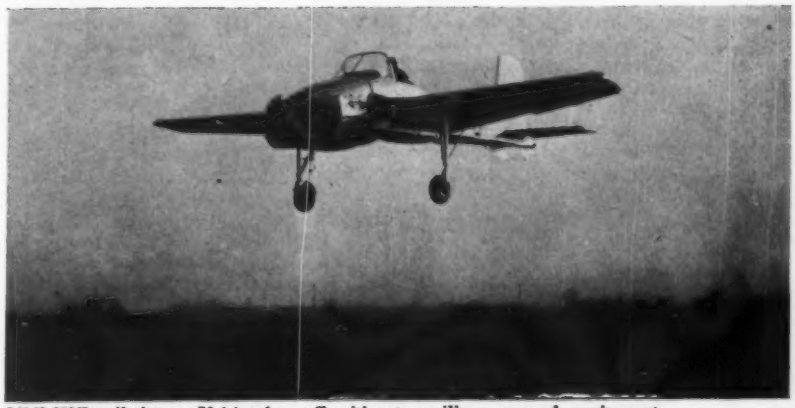
Other methods of gaining VTOL include tilting wing, tilting ducted propellers, deflecting airstream by special flaps, hover-jet using supplementary engines for vertical thrust.



AILERON control in hovering or slow speeds is effected by wing-tip jets.



FIVE jet streams provide hovering lift, aerodynamic control at takeoff.



UNLIKE tail-sitters, X-14 takes off without auxiliary ground equipment.

Temco's new jet trainer—a private pilot's opinion

by Pilot Anonymous*

To a man who first soloed an Alexander Eaglerock with Hisso power, the new Temco Jet Trainer (Navy Designation: TT-1) is an aerial dreamboat. Built from scratch in four months at Temco's Dallas plant, the company used $3 million of its own R & D money to make a ship it hoped the Navy would like. The Navy did, ordering 14 of the TT-1 series last year—the first primary jet trainer to be bought by the U.S. military. It is a tandem-seating, 2-place, mid-wing aircraft. In the works now is a Navy order for upwards of 300 of these ships.

The TT-1 prototype was at Anacostia Naval Air Station in June and this reporter experienced its true jet feel and forgiving qualities. The TT-1 prototype is powered by a Continental J-69-T-9 engine, delivering 920 pounds of thrust. TT-1 models for the Navy follow-up order will be engined by a more powerful J-69, giving 1,050 pounds thrust. Airframe is stressed to take up to a 2,000-pounds thrust engine, but the light Continental (385 pounds) provides plenty of soup for

all student flight maneuvers, including all conventional aerobatic maneuvers.

With an ultimate load factor of 11.25 Gs, the ship's maximum allowable dive speed is 450 knots. This red line speed is higher by far than for any other primary trainer in U.S. manufacturing history.

The TT-1 handles easily at both ends of its speed spectrum, stalling out at 63 knots, indicated, with a mild, warning buffet about four or five knots before the actual stall, which breaks clean. Control surfaces are responsive down to the full stall, with rudder control and a surprising amount of aileron control still available even as the nose drops through. At cruise speeds (230 knots, indicated, at 92% of power) the ship flies itself, responding with great sensitivity to the electrically controlled trimtab switch built for thumb operation on top of the stick control.

Matter of fact, the single feature of the TT-1 that takes a few minutes of flight maneuver to master is its extraordinary control sensitivity. To the pilot shaped and formed in the cockpit of piston-engined aircraft, jet plane control sensitivity often is a problem, anyway. Years of man-handling sticks and yokes inevitably means over-controlling in the jets. The TT-1 manages even to forgive this habit, however.

Temco's engineers perhaps have achieved even more with the TT-1 than they intended when they first considered Navy's tentative specs for a primary jet trainer. The feeling among private pilots who have flown the ship—including California Congressman Clair Engel, who uses a Piper Tri-Pacer to cover his district back home—is that Temco has designed a true primary trainer, a very sturdy ship that an average student may solo in the traditional piston-engined time of six to eight hours.

Among the reasons why:

An exceptionally widespread tricycle landing gear, virtually eliminating ground loops. In takeoff, the ship is steered with light taps of the brakes up to 43 knots, after which the rudder takes effect. Landings are easy, because of the relatively low approach speed—85 knots, indicated—with an over-the-fence speed of approximately 70 knots. Landings may be made with the ship's tail-mounted speed brake open in order to provide additional deceleration on approach and shorten the ground run.

A big Plexiglas canopy, which gives unobstructed vision in all directions for both student and instructor, as both seats are forward of the wing.

The rugged airframe design that will enable any Dilbert to make virtually any sort of flying error regarding speed or altitude without damaging the aircraft.

The forgiving quality of the design—mentioned before—which is largely due to a noteworthy combination of three different airfoil sections, in which the outboard wing remains flying long after the root has stalled, giving fair aileron control well into the stall.

In summary, a sleek and forgiveness-prone aircraft fully within the requirements of the primary military pilot training phase. When the jet age finally comes to civilian pilot training schools in the U.S., this reporter hopes to find a civil version of the TT-1 on the line.

*** About the author**

THIS FIRST-HAND REPORT of a check-out in Navy's Temco TT-1 trainer was written exclusively for AMERICAN AVIATION by a licensed civil pilot and an accomplished aviation reporter. Name withheld for author's personal reasons.

Allison gets contracts totalling $25.7 million

Allison Division of General Motors received two Air Materiel Command contracts for $12,337,920 and $13,456,805. The first covers the J71 engine production program and the second is for Aeroproducts propellers and components for the C-130. The propellers will be manufactured by Allison's Aeroproducts Operations.

Other contracts, according to the Commerce Department, went to:

Bendix Aviation Corp., Radio Division, $2,171,199 for AN/FPN-34 radar sets; Otis Elevator Co., $2,230,547 for bombing and navigation radar trainers; Federal Manufacturing Corp., $1,143,414, modulator power supply; Sperry Gyroscope Co., $1,298,518, altitude flight data systems; Solar Aircraft Co., $1,384,202, gas turbine generator sets; Bell Helicopter Corp., $1,405,000, YH-40 fatigue and qualification testing; Collins Radio Co., $1,516,343, production data for AN/ARC-52 sets.

Air Materiel Command awards GE big contract

General Electric Co. has received a $12,213,300 contract from Air Materiel Command for development of the J85 engine. Contract covers product improvement of the 2,400-lbs.-thrust engine. J85 is competitive with the Fairchild J83.

There have been reports that one of the two engines will be sacrificed in a "belt-tightening" under way in the Air Force.

GE also received a small follow-on contract of $4 million for its J79.

Boeing proposes B-52G move to Wichita

Final details of the Boeing proposal to center production of the B-52G at Wichita and the Bomarc at Seattle are being worked out by Air Materiel Command.

Switch of the B-52G work to Wichita is expected to result in a delay of a month or two, with the first rollout at Wichita slated for around June 1958. The Seattle line would phase out in the fall of 1958.

The proposal was made in an effort to make savings. Substantial benefits are expected because of tooling at one plant instead of two.

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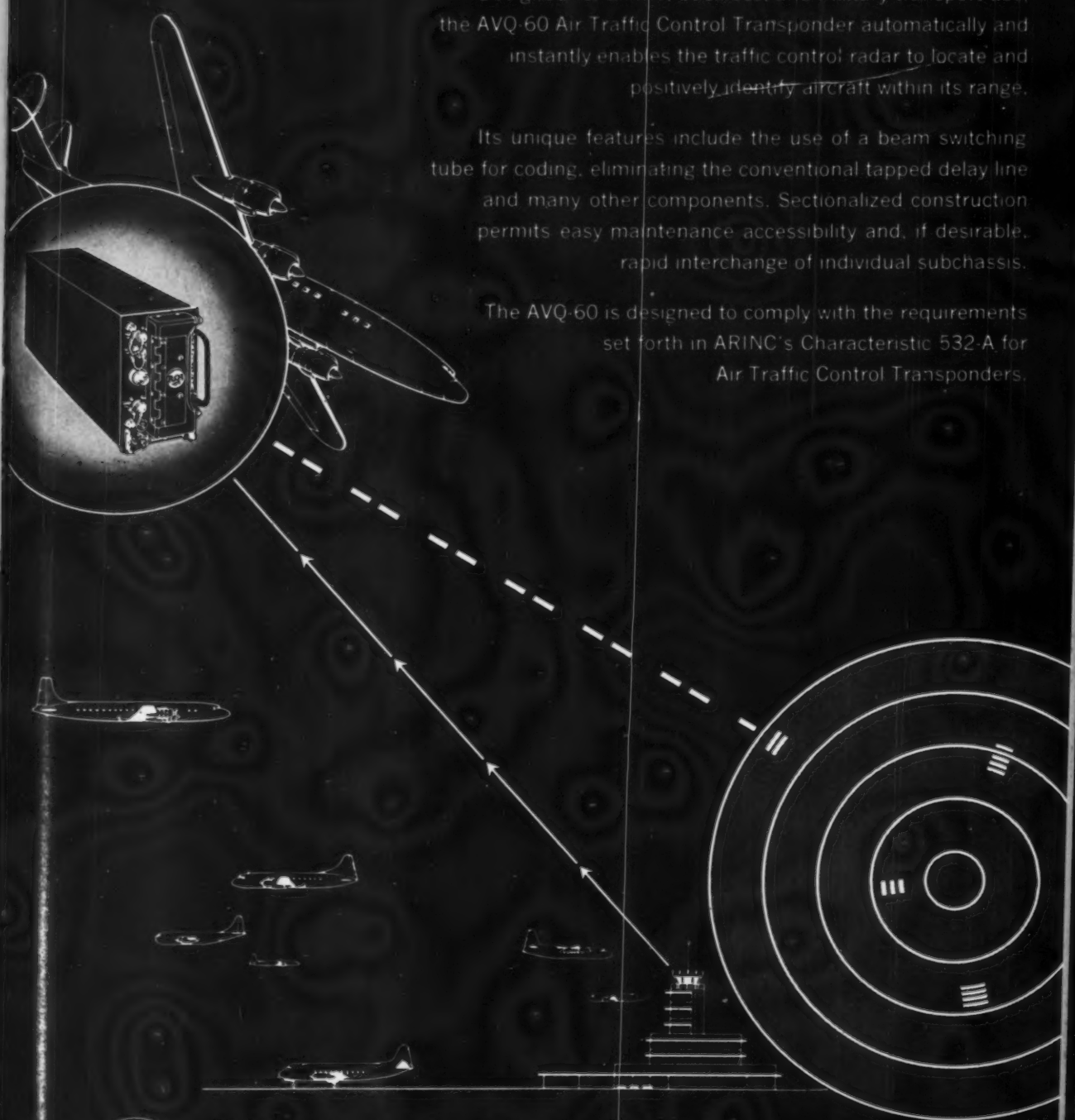
The AVQ-60 is designed to comply with the requirements set forth in ARINC's Characteristic 532-A for Air Traffic Control Transponders.



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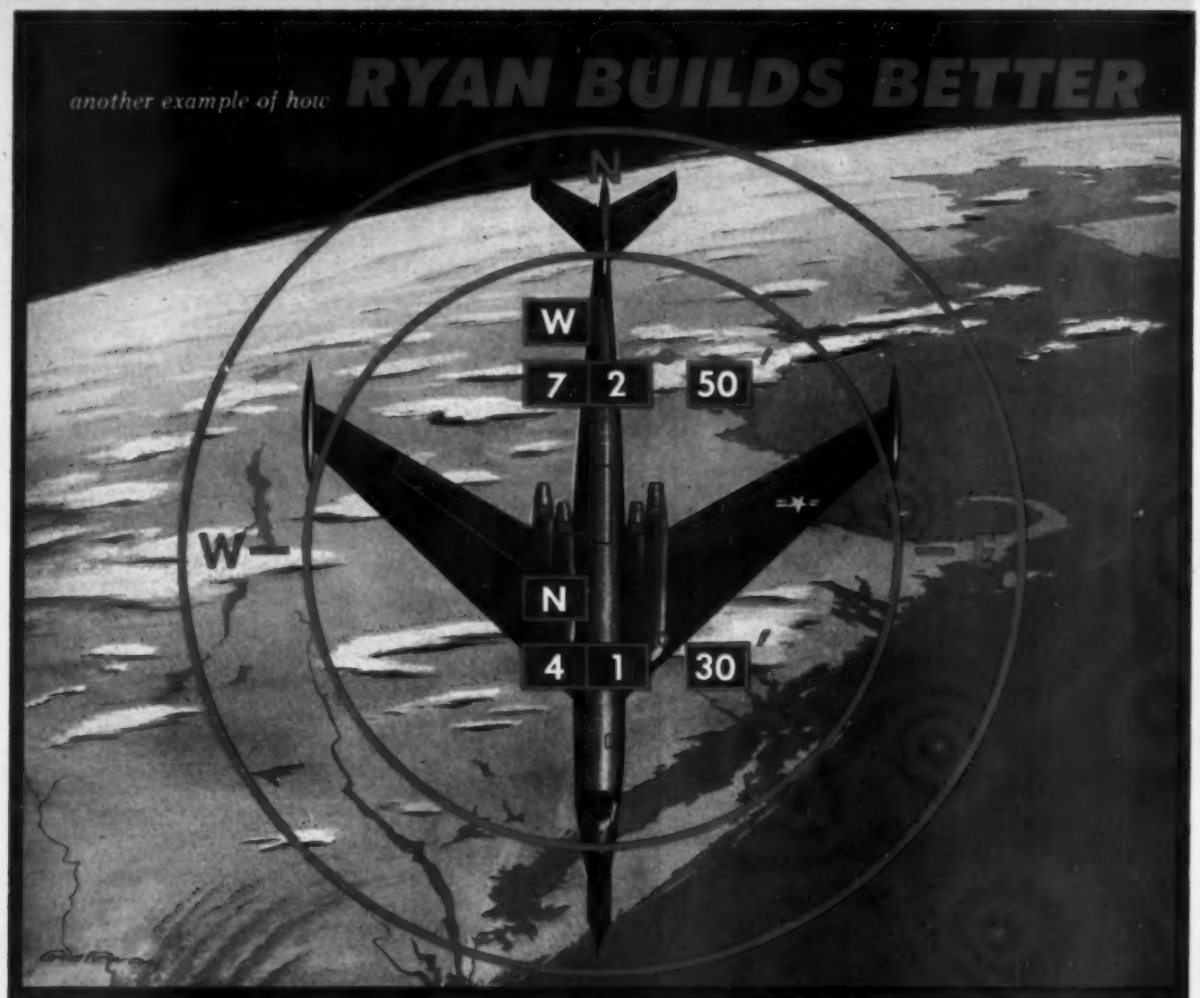

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An advanced system of aerial navigation, with the speed and precision demanded by high speed jet flight, has been developed by Ryan under sponsorship of the Navy's Bureau of Aeronautics. Using continuous-wave radar, in which Ryan is a recognized leader, the Ryan AN/APN-67 navigator will enable fast-flying military planes and future commercial jetliners to travel to any point on the earth's surface with new accuracy and speed.

Instantaneous in operation, the Ryan navigator gives the pilot his position (latitude and longitude), *ground* speed, *ground* mileage, drift angle and *ground* track in continuous, readable form. No computations are necessary. The equipment is compact and self-contained. No ground facilities are employed—no wind information or aerological data are needed.

This significant contribution to jet navigation is typical of the work which Ryan and the military services are accomplishing in other fields of electronics research such as supersonic missile guidance for the Air Force and helicopter hovering devices for the Navy.

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Lithium emerges as major aircraft material

Lightest known metal destined for wide use in nuclear planes, zip fuels, lubricants, metallurgy and ceramic applications

by William Beller

Lithium, nature's lightest metal, is finally shedding its "rare" metal cloak to become a highly useful engineering material. Marshall Sittig, American Lithium Institute president and managing director, estimates that domestic industry will use over one million pounds of the metal annually by 1970.

This figure is several times the industry's current production rate and several thousand times the production rate about a decade ago.

Lithium, which has less than half water's density, is finding use or high consideration in such wide apart categories as nuclear shields and coolants for nuclear-powered aircraft; high energy or zip fuels; materials for brazing stainless steel, titanium and the light metals; de-icing solutions; greases and lubricants; catalysts for making a new synthetic rubber which Firestone says is the equal of natural rubber; additives that render ceramics thermal shock-resistant, and alloying ingredients for giving increased strength and workability to light metals such as magnesium and aluminum.

Based upon an extensive survey made by the Lithium Corporation of America, the company's vice-president, Walter M. Fenton, estimates that available known reserves in North America alone contain upwards of 98 million units of lithium in spodumene—chief lithium ore. (A unit is 20 pounds of lithium oxide per ton of spodumene.) Of these reserves, 36 million units have been uncovered in the U.S., the balance having been reported in Canada.

Therefore in the event of serious military need for lithium, the U.S. would not be dependent upon overseas sources for this strategic material. Fenton says that even at the present high rate of ore consumption, the North American reserves could easily be expected to last more than one hundred years.

Over the past two years an accelerated demand for lithium has resulted in our uncovering heretofore unknown lithium ore bodies. Thus, any

U.S. Production Capacity, lithium carbonate or its equivalent.

Based on data prepared by P. E. Landolt
(in thousands of pounds annually)

Company	1946	July 1952	Sept. 1954	1955	1956
Maywood Chemical Works	1,000	1,000	1,300	1,300	1,500
Lithium Corp. of America, Inc. ..	3,000	3,000	3,000[1]	13,000	21,000[3]
Foote Mineral Co.	0	725	6,000	12,000[2]	12,000
American Potash & Chemical Corp. (inc. American Lithium Corp.)	0	1,175	1,500	1,700	7,700[4]
Total—U.S.A.		5,900	11,800	28,000	42,200

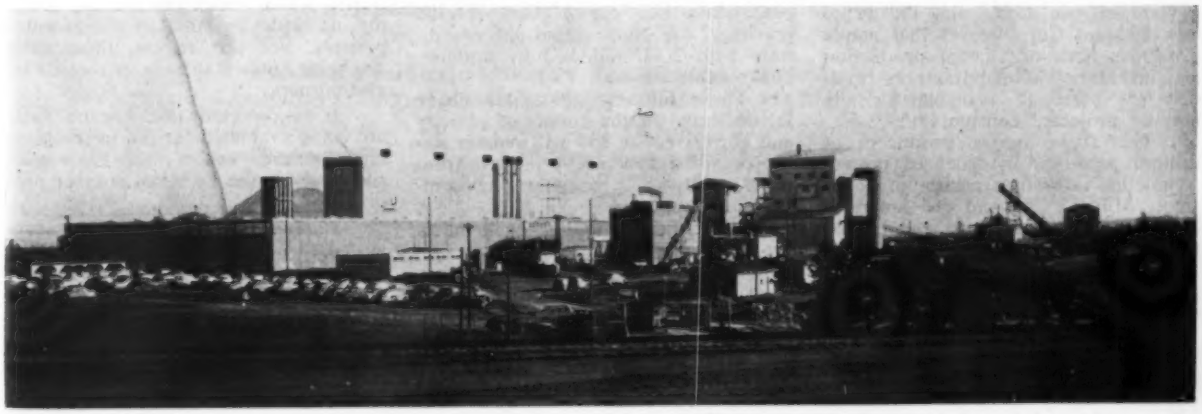
[1] *Prior to operation of plant at Bessemer City, N. C.*
[2] *Appears to be in excess of quantities of ore mined at Kings Mountain, N. C. and used in chemical plant at Sunbright, Va.*
[3] *Reflects potential capacity at Bessemer City, using concentrates instead of low grade ore.*
[4] *This figure includes San Antonio, Tex., plant. Earlier figures represent recoveries from brine recovery at Trona, Calif. The total figure is estimated and may be more or less as determined in actual full scale operations.*

In Canada, Quebec Lithium is producing only concentrates shipped to Lithium Corp. of America: 160-200 tons/day.

Potential Increase in Capacity:

U. S.: Basic Atomics, Inc., North Carolina.

Canada: National Lithium Corp., Yellowknife, N.W.T.



RAPIDITY OF LITHIUM FACILITIES construction seen in a Lithium Corp. of America, Inc., plant for which slab was laid at Bessemer City, N. C., only six months before this picture was taken. Ore extraction and chemical processing were begun in January 1955.

additional requirement for the element would spur on even greater prospecting activity.

According to Fenton, few if any lithium deposits have been explored to their full potential. Indeed, only those deposits having relatively bold outcrops have been investigated.

While prices for lithium metal and lithium compounds have been appreciably reduced over the past decade, it cannot be assumed that this trend will continue proportional to demand. Nature has placed a floor under prices by limiting the content of the principal ore to 0.6% lithium. Therefore, future requirements should be calculated at essentially today's prices, according to Fenton.

There also appears to be the idea that substantial quantities of lithium are tied up for government use, or are being withheld from industry or new government use. Countering this belief is a Lithium Corp. report that ample quantities both of current production and inventories of manufactured products are currently available for any new or projected consumption.

The three major producers of lithium products, in order of present production capacity, are Lithium Corp., Foote Mineral Co., and the American Potash & Chemical Corp., which has recently announced opening of new facilities. A fourth producer, although a relatively small one, is the Maywood Chemical Works.

In the propellant field, lithium products offer a strong potential. For example, several of the lithium salts could be highly useful as oxidants in a composite solid rocket propellant. Among such salts are lithium nitrate and lithium perchlorate.

Among the characteristics of an optimum oxidant are high oxygen content in order to minimize the amount of material going along just for the ride, high density for container economy and vehicle performance, good stability for ease in handling and storing, non-toxity to allow man to work with the material, and non-corrosiveness in order to hold the material.

Lithium perchlorate and lithium nitrate are at the top of the ladder of inorganic oxidants with respect to available oxygen content. Ammonium perchlorate, which services about 80% of today's high performance solid propellants, contains only 54.4% oxygen by weight. In contrast, lithium perchlorate contains 60.1% and lithium nitrate 69.5% oxygen.

Of the three salts, the lithium compounds also hold the advantage from the density point of view. Lithium perchlorate has the highest specific gravity, 2.43. Next comes lithium nitrate with 2.38, followed by ammonium perchlorate with 1.95.

These lithium salts also behave satisfactorily on the counts of toxicity and corrosiveness, and will remain stable provided they are protected from water with which they readily combine.

What then is holding back industry-wide acceptance of these compounds? If we accept availability, then most importantly, we do not have full technical data on their performance as propellant components. For example, how much will rocket performance suffer because the combustion products of lithium salts contain solids rather than gases? How much energy will be used up in extracting oxygen from lithium compounds? From a procurement viewpoint, who will assure us of adequate and economical lithium salt production?

As a monopropellant constituent for liquid rockets, the lithium salts such as the perchlorate and the nitrate offer good possibilities. The salts are highly soluble in alcohol. As an example, methanol can hold nearly 65% lithium perchlorate. Thus, the rocket designer is given a propellant containing a high-heating-value fuel plus a high density and oxygen-bearing oxidant.

In the jet field, powerplant emphasis is on developing special fuels that can adequately power ramjet engines and afterburner-equipped turbojet engines. In the high-speed flight regimes where such engines are used, the fuels must yield high flame temperatures for increased thermodynamic cycle efficiency which would give the combustion products high kinetic energy for increased thrust.

Research indicates that advantage would be gained if these special fuels contained light metals or their hydrides. A recent NACA report says that such paint-like suspensions of fine particles of metal in a hydrocarbon (slurries) show excellent combustion performance.

Among such fuels that are interesting aircraft manufacturers are slurries of magnesium, aluminum, berrylium or boron in hydrocarbons. This fact also indicates the possibility of dispersing lithium or lithium hydride in kerosene for a jet engine fuel, which is implied in a patent assigned to Aerojet-General Corp. The company proposes using (here, for rocket propulsion) "a liquid fuel consisting essentially of a suspension of lithium in gasoline."

Among other new high energy fuels that the military and industry are pushing are the boranes and boron itself. Present means for preparing the boron derivatives highlight the use of lithium hydride, which combines with boron trichloride to form diborane. From the diborane, the higher boranes can be developed.

The borane fuels burn to boric oxide, which either shellac or erode turbine blades or other jet engine components. For this reason, these fuels are being studied for use in ramjets or afterburners.

It is reported that borane fuels are being evaluated for use in the Navajo, Bomarc, Triton and Talos missiles and for the chemical bomber program.

Lithium hydride has been suggested as a neutron shield for nuclear-powered aircraft. The material is prepared by heating either liquid or molten lithium in a hydrogen atmosphere. The hydride melts at 684°C, which is much higher than the melting point of the pure metal, 180°C.

The neutron absorption capacity is usually given in barns, which is a measure of the probability of neutron capture by the material. Of the light

Physical properties of metals and water

	Density (gm/cm3)		Melting point (°C)	Boiling point (°C)	Latent heat of fusion (cal/gm)	Volume change on fusion (% of solid volume)	Latent heat of vaporization (cal/gm)
Lithium	(800°C)	0.46	179	1,317	158	1.5	4,680
Sodium	(700°C)	0.78	98	883	27	2.5	1,005
Sodium-Potassium 44% Potassium	(700°C)	0.70	—11	784	..	2.5	....
Lead	(800°C)	10.04	327	1,737	5.8	3.6	205
Mercury	(300°C)	12.88	—39	357	2.8	3.6	70
Water	(4°C)	1.0	0	100	79	—8.3	540
Bismuth	(800°C)	9.40	271	1,477	12.0	—3.3	204
Lead-Bismuth 55.5% Bismuth	(800°C)	9.64	125	1,670	...	0.0	....

	Heat capacity (cal/gm°C)	Thermal conductivity (cal/sec-cm°C)	Viscosity (centipoises)		Temp. for 10 mm Hg vapor pressure (°C)	Electrical resistivity (micro-ohms)	
Lithium	1.0	0.09	(980°C)	0.41	890	(230°C)	45.3
Sodium	0.31	0.16	(700°C)	0.18	548	(300°C)	16.7
Sodium-Potassium 44% Potassium	0.21	0.06	(700°C)	0.15	458	(200°C)	47.0
Lead	0.037	0.036	(845°C)	1.19	1167	(327°C)	94.6
Mercury	0.032	0.03	(200°C)	1.0	184	(300°C)	127.5
Water	1.0	0.001	(100°C)	0.28	11		....
Bismuth	0.04	0.037	(600°C)	1.0	1067	(300°C)	128.9
Lead-Bismuth 55.5% Bismuth	0.035	0.026	(600°C)	1.17	1100*	(300°C)	118.0

* *Estimated.*

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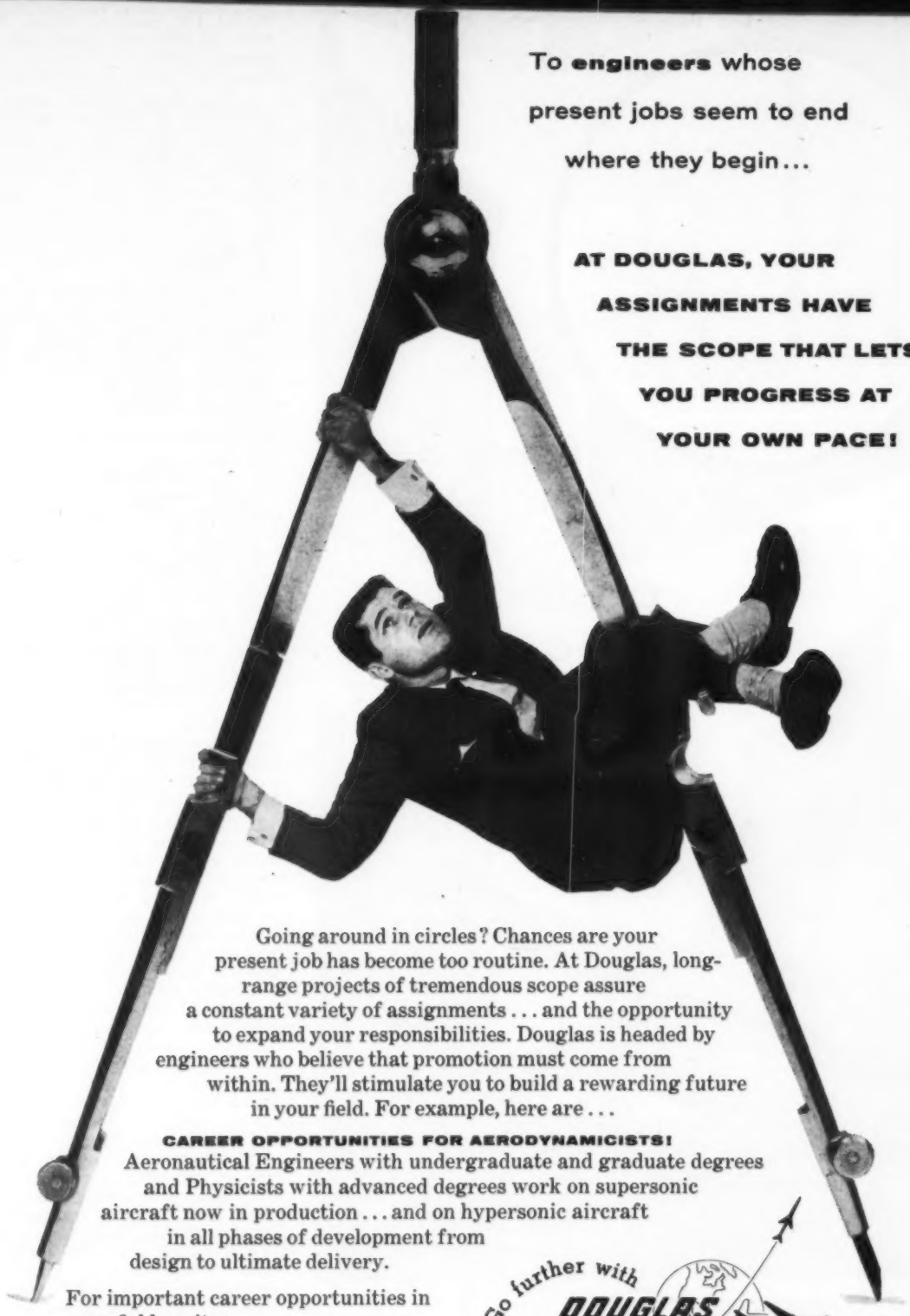

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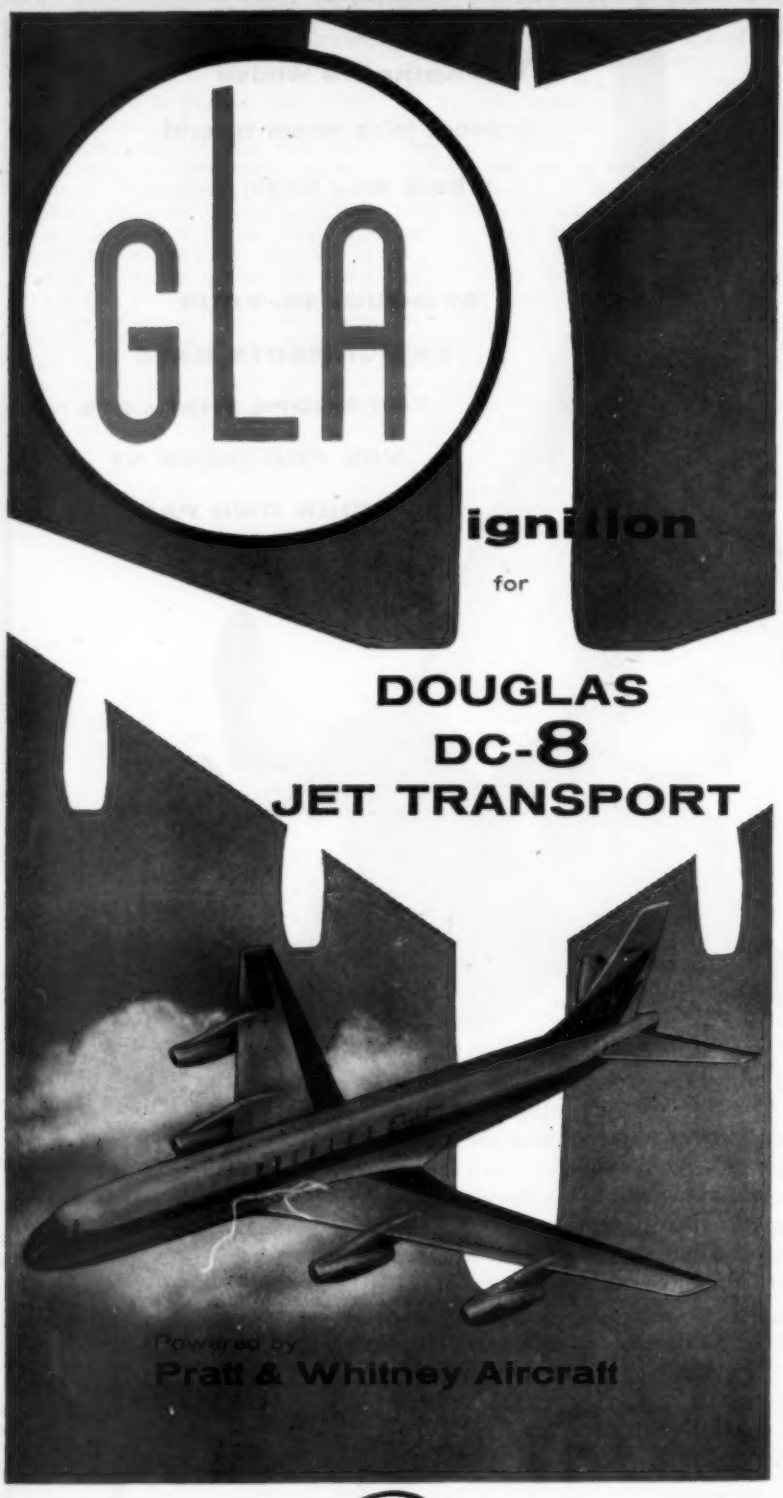

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metals, the isotopes lithium 6 and boron 10 show the highest neutron absorption cross-section: lithium 6—950 barns; and boron 10—4,020 barns.

These cross-sections are based on the capture of slow moving (thermal) neutrons. Since the neutrons that would be radiating from an atomic pile would be fast moving, a moderator to slow down the neutrons is necessary, and among the better ones is hydrogen. Thus, a lithium hydride or boron hydride appears to have good shielding characteristics.

Not much information is available about the physical and mechanical properties of the hydrides. What is known is that the materials behave somewhat like graphite under machining operations. In general, the hydrides are fairly strong and easy to handle.

Coolant for nuclear reactors

The lithium 7 isotope, the more common one, has qualities that make it highly useful as a coolant in an airborne nuclear reactor. The metal has a low melting point (180°C) and a high boiling point (1,317°C). Thus it could be used as a coolant over a 1,000°C temperature range, 200°C to 1,200°C, at atmospheric pressure. Since lithium is so light, total coolant weight would be minimum. Because of lithium's low density, high fluid velocities could be attained.

Lithium is the only metal that has a specific heat as high as water. Thus, the coolant volume required would be relatively small. Pump power could also be made small since liquid lithium has a relatively small viscosity.

Possibility of the liquid boiling over at system hot spots is small because of the material's high heat of vaporization—nearly nine times that of water. Also, the latent heat of fusion is high, twice that of water, which would decrease the possibility of solidification of the coolant at points of heat loss that would bring the material near its melting point.

On physical properties alone, then, lithium seems almost ideal as a coolant. Unhappily, there is a problem: how to contain liquid lithium, which is highly corrosive when impure. If research activity in this field is any measure of success, the answer to this problem may be near at hand.

Lithium can play an important role in the brazing process, which is the joining of metals at a temperature above 800°F but below the melting point of the metals to be joined.

Joining is done by a brazing alloy (filler metal) which by melting at a temperature lower than that of the metals to be joined fills the gap of the joint. The brazing metal then cools and solidifies and leaves what is hoped to be a solid joint.

To obtain such a joint most of today's brazing metals must be used either in a reducing atmosphere or with a flux. The flux has three purposes: it must dissolve any oxides present on the base metal surfaces in or-

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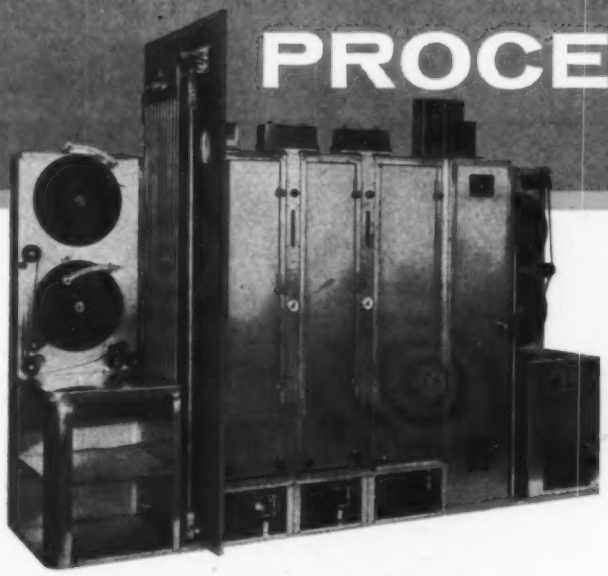

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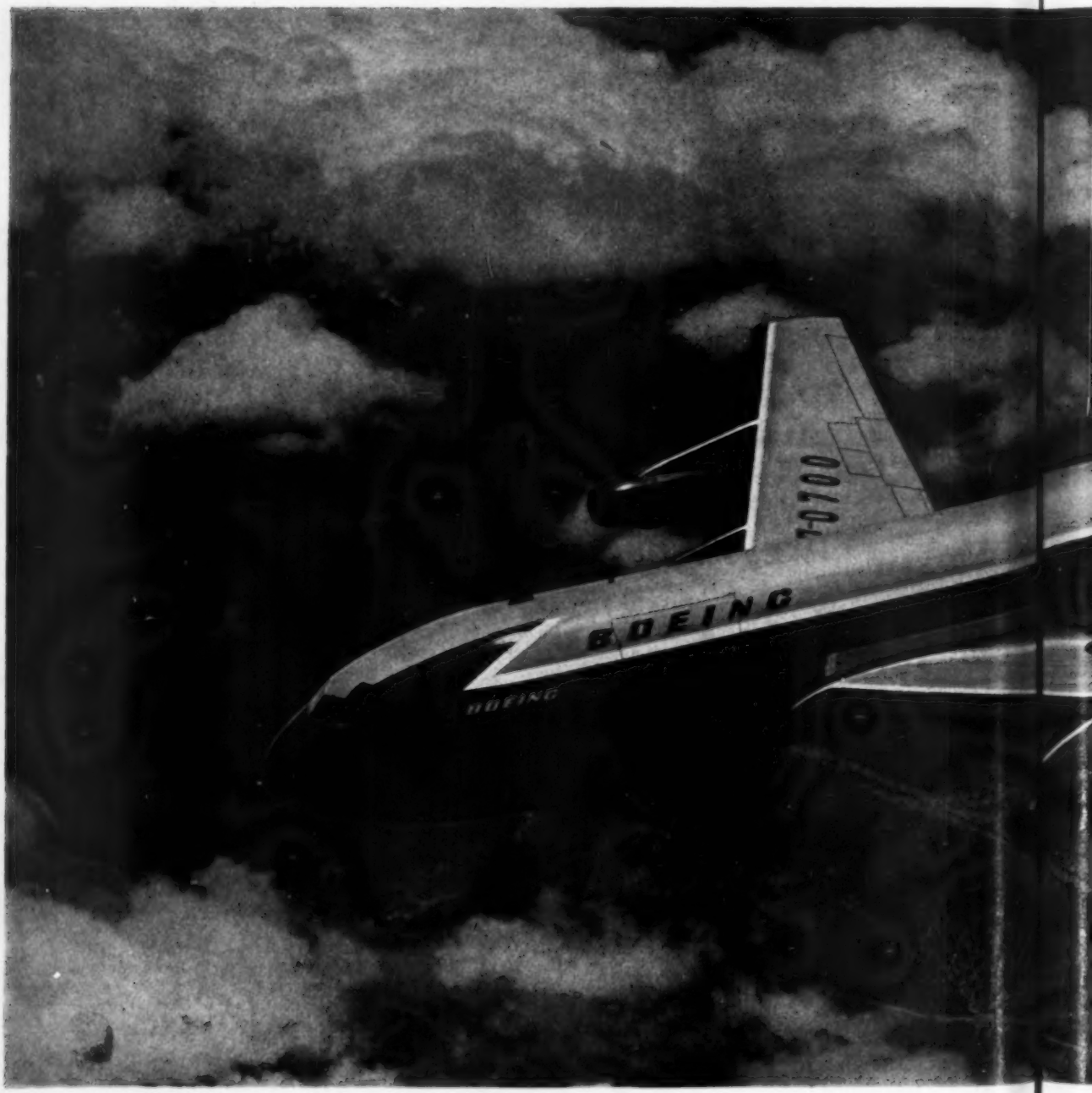

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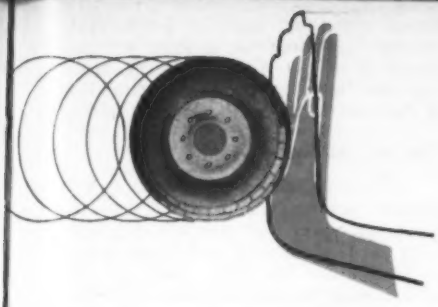

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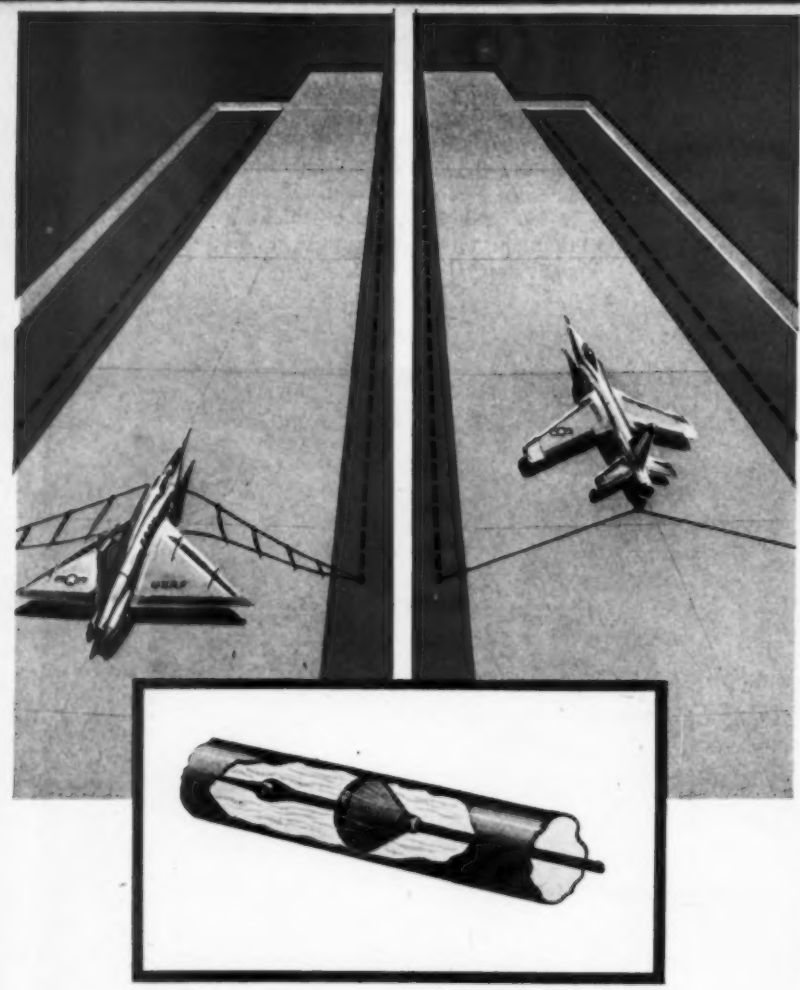

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der to clean the joint in preparation for the filler material, it must prevent oxidation of the surfaces during brazing, and it must promote wettability of the base metal by the brazing metal.

Flux inhibits penetration

However, the presence of a flux presents serious problems, particularly when the newer high-strength materials such as stainless steel and titanium are to be joined. The flux, which is saturated with the metal oxides it forms, inhibit the brazing metal's penetration into joints with small dimensions. This leads to joint porosity and weakness.

If brazing is done in a reducing atmosphere, which lowers the oxide concentration on the surface of the metals being joined, a higher brazing temperature is needed. At such a temperature, a stainless steel as an example is open to accelerated oxidation, particularly if appreciable water vapor is in the atmosphere.

The difficulty of joining stainless steel is seen in one industry technique that calls for a thin iron coating on the joint preliminary to brazing.

The Armour Research Foundation of the Illinois Institute of Technology recently found that by adding lithium to brazing alloys the melting point of the brazing alloy was lowered, thereby lowering the working temperature. In effect, a self-fluxing "air-proof" alloy for brazing metals was developed.

As a result of this work, carbon and alloy steels, for example, can be efficiently brazed without need for a reducing atmosphere or fear of flux intrusion.

Armour is at present concerned with lithium formulations able to deposit sound metal in titanium alloy joints.

Navy's de-icing formula

During the past five years a lithium chloride solution has been used by the Navy for de-icing parked aircraft. This de-icing formulation is particularly good in the temperature range between —15°F and 25°F.

The recommended patented formula contains by weight 39 parts lithium chloride, 60 parts water, 1 part potassium chromate, 0.8 part carboxy methyl cellulose and 0.5 part wetting agent.

The water is used as a solvent to ease application of the lithium chloride as a film, the potassium chromate is used as a corrosion inhibitor, the carboxy methyl cellulose supplies body to the aqueous solution, and the wetting agent aids in spreading the de-icing material.

Tests of the lithium chloride de-icing solution made by Prof. R. H. Upson, University of Minnesota, showed that the formulation melted 119% more ice at —15°F and 73% more at 25°F than an 80% glycol solution. In each case, the de-icer was used at room temperature.

Armour, under contract to Wright Air Development Center, has devel-

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oped a de-icing solution that can be used on aircraft that do not have de-icing equipment. The material is applied to the wing leading edge before takeoff. When the plane travels through icing conditions, the de-icer, which is covered by a water insoluble film that is ruptured electrically, is released to do its job.

This de-icer consists of lithium chloride dispersed in a polyvinyl alcohol matrix, which results in a tape type material.

Other uses

A complete rundown on the uses of lithium would have to include their employment as a stearate in broad temperature-band lubricants or greases, which have the water resistance of calcium stearates and the temperature resistance of sodium stearates.

As an additive to ceramic bodies, lithium carbonate imparts thermal shock resistance and can bring thermal expansion rates down to zero. Rocket applications are foreseen here.

In metal refining, lithium shot acts as a deoxidizer, desulfurizer and degasifier. Lithium, for example, is used in making oxygen-free, high-conductivity copper.

In metallurgy, lithium can serve as a hardening agent in bearing metals.

The lithium industry is not worried about its future. The industry believes it is producing an almost universal basic metal, with respect to present and possible uses. What the industry is asking, though, is why with the demonstrated utility of lithium is the aircraft industry so slow in using the material.

Perhaps the answer is that lithium has been thought unavailable on a production scale. This objection is no longer valid. Perhaps not enough technical information about lithium is known. This lack is being increasingly filled, and will soon be of relatively minor extent. Perhaps the relatively high cost of lithium has argued against its use. Since there is small chance that the price will go down, this objection will continue to be valid.

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4) *Uses of Lithium Metal*, Walter M. Fenton, Donald L. Esmay, Ronald L. Larsen and Herbert H. Schroeder, American Chemical Society meeting, April 10, 1956.

5) *Rocket Propulsion Method*, F. J. Malina et al, Pat. no. 2,771,739, Nov. 27, 1956.

6) *Presenting Lithium*, American Lithium Institute, Inc., P. O. Box 549, Princeton, N. J.

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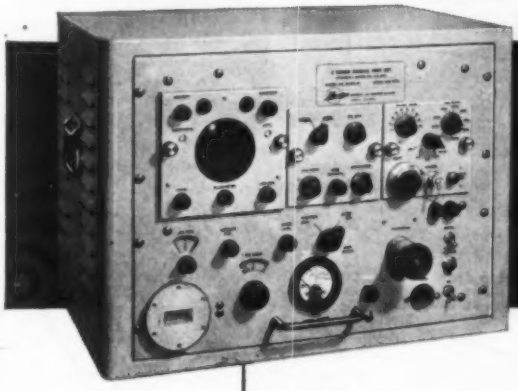

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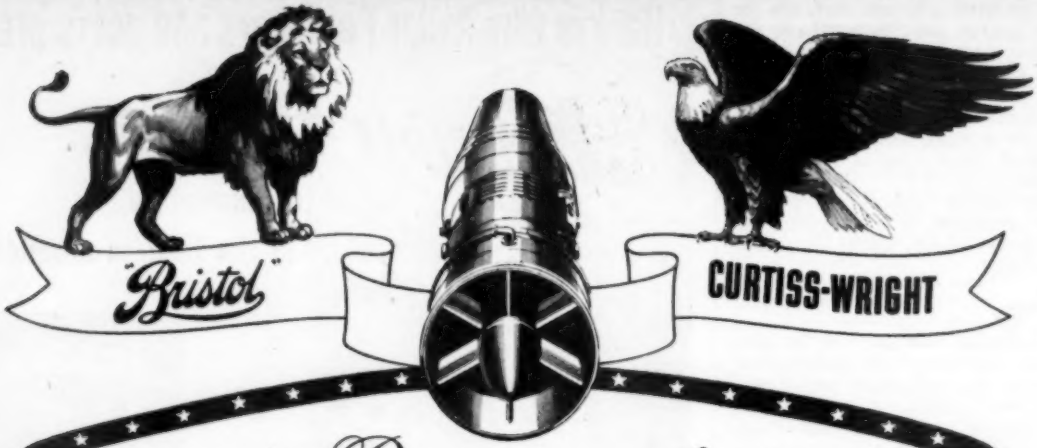


Presenting the ZEPHYR

The recent demonstration of the new Zephyr jet engine for commercial transports, at the Curtiss-Wright Research and Development Center, Quehanna, Pa., created many requests for data on how this engine works.

• The Zephyr was developed in England by Bristol Aeroplane Co., Ltd. in collaboration with Curtiss-Wright. It has had 30,000 test stand and 5,000 flying hours. It is the first engine designed specifically for subsonic commercial jet airliners, all others to date being designed primarily for military use at supersonic speeds.

The Zephyr develops 5 lbs. thrust per lb. of weight. Its turbine and combustion areas operate several hundred degrees below other jet engines—therefore are not subject to thermal shock and fatigue, creep, or distortion. The resultant long, trouble-free life provides for high utilization, without the penalties the military accepts to get all-out performance.

The Zephyr's "cool engine" design gives lowest possible fuel consumption at cruise. It uses just half the fuel of other jet engines at idle, because of lower idle speed.

The Zephyr's "quiet engine" design gives 20% slower jet gas exhaust, through a larger nozzle. Also, a fluted noise suppressor breaks up the noise-generating and carrying capacity of the jet by producing air shearing over a 50% larger periphery in the nozzle—without reduction of engine performance.

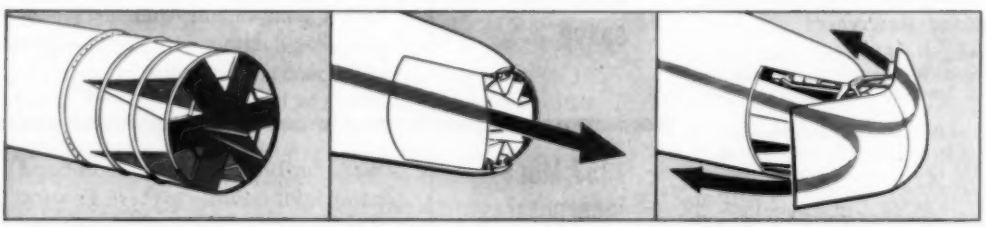
The Zephyr is fitted with a thrust reverser that cuts dry runway stops 35%; icy runway stops 70%. The reverser permits higher altitude approaches, plus air braking for more direct and quiet landings. Full power for emergency go-around is instantly available.

Zephyrs in a modern jetliner will result in a 10,000 lb. reduction in takeoff gross weight, 3,000 lbs. lower fuel consumption New York to Los Angeles. A fleet of 10 Zephyr-powered planes should use $500,000 less fuel yearly. Water injection and related apparatus are not required. The Zephyr's performance *has been matched* to jet transport requirements, and permits takeoffs from any principal U. S. airport, regardless of temperature and altitude.

The Zephyr's designed-in quietness will not disturb the community as do military type jet engines.

Due to low temperatures, hot-end replacements should be reduced $10,000 per engine yearly, and the increased reliability will provide high utilization with resultant increased earnings.

The Zephyr meets the needs of the airlines to a greater extent than any jet powerplant, and is designed to win the full acceptance of both industry and the public.



The fluted noise suppressor of the Zephyr makes a quiet engine quieter. Noise is below current transport engines, and far under military jets.

The new Curtiss-Wright thrust reverser is installed around the noise suppressing nozzle and does not affect engine power or performance.

In closed position, the reverser deflects gases forward to shorten landing runs as much as 70%—permitting operation from existing runways.

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Military Services Push Development of Long-Range Navaids

Air Force reappraises Navarho potential, while Navy looks into radio astronomy as optimum system for vessels

by Henry P. Steier

NEW REQUIREMENTS for U.S. military forces to operate over long distances with advanced weapons have brought increased emphasis on development of more precise long-range navigation methods.

Two of the navigation systems now under development and further details on performance of recently declassified Doppler systems were revealed at the 13th Annual Meeting of the Institute of Navigation in Washington, D.C.

Air Force has been taking a new look at the Navarho system developed in 1949, and Navy is about to evaluate missile ship and submarine navigation by radio astronomy.

Long interested in supplementing its self-contained Doppler and inertia navigation systems by a ground-based position-fixing radio system, Air Force has just completed the first full-scale flight evaluation of Navarho's potential.

A low-powered, 4 kw station located near Rome Air Force Base, Camden, N.Y., has been operating for AF evaluation during the past year. Results obtained to date were reviewed by Mortimer Rogoff, executive engineer, Federal Telecommunication Laboratories.

Navarho operates in the internationally allocated band of 90-100 kc and is a narrow-band system with adjacent channel separations of 1 kc.

The transmitting station emits a continuous wave from three vertical towers. Excited as pairs between alternate towers, the antennas produce three figure-eight patterns around the station.

Navigational information provided is rho-theta. Bearing is in relation to the station and distance read is that between the receiver and station.

Bearing determination is by phase measurement, and distance is by phase comparison with an airborne frequency standard. Latter is a crystal "clock" whose stability is one part per billion over 12 hours.

By measuring both carrier or radio frequency phase, and that of a modulation frequency established at the transmitter a form of course and fine distance measurement could be made.

If the carrier were 100 kc the reading would repeat, or be ambiguous, every 1.6 nautical miles. And if the modulation were 100 cycles per second, the full-scale reading would be 1,617 nautical miles before repeat.

Air Force flight evaluation of Navarho is now complete and a full report will be issued later this year.

Trend of results shows distance error at 2,000 miles range is 2-3 miles. This figure was obtained after the error inherent in the primary frequency standard—the crystal clock—was removed from test results.

Bearing error predicted is 1 to 1½ degrees over the same distance, and 0.5 degree to 1,500 miles, after the clock error is removed.

Rogoff said the most startling result was that phase measurement on the carrier was not once lost in a Rome, N.Y., to Panama flight.

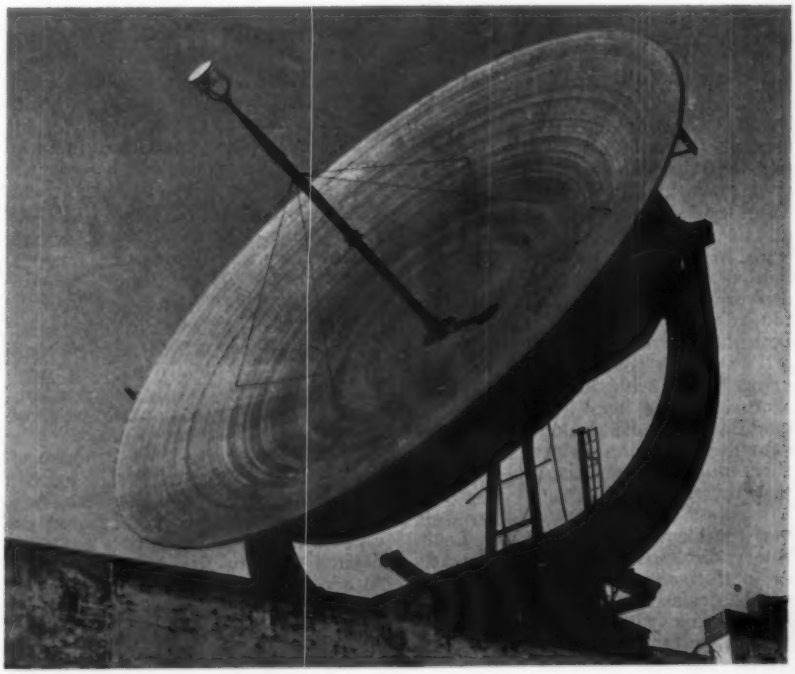
Equipment now in use for testing weighs 100 pounds and occupies two cubic feet of space. However, work is under way to prepare AF contracts for procurement of all-transistor equipment for tests.

Also, development contracts are being considered for the construction of airborne atomic frequency standards. These will give a more precise frequency reference that should add to Navarho accuracy, and they do not require long warm-up time.

According to Rogoff, existence of a Navarho network of 30 ground stations located at world-wide points would open up new possibilities for use by international aviation, both for rho-theta measurements and hyperbolic lines-of-position fixing.

Called Navarho-H, airborne equipment for hyperbolic "fixing" would listen to a pair of stations. For this case no "clock" would be needed. The distance signal from one station would become the frequency reference for the other station's signal.

Intersection of the bearing line of position with the differential distance between the two stations would create a position of fix.



RADIO ASTRONOMY tracking antenna used by Naval Research Laboratory to study signals from different stellar bodies. Navy intends to install radio astronomy equipment on its USS Compass Island navigation system laboratory ship. New techniques will enable use of much smaller antennas than this 50 foot dish.

Rogoff contends that with the hyperbolic feature, many classes of users in international aviation could be served. Equipment installation could be varied to provide "bearing only," "bearing and distance," "bearing-plus hyperbolic" or "hyperbolic-hyperbolic."

With a transmitter of 100 kw, a 2,000-mile bearing range within one degree could be obtained from equipment weighing 25 pounds and occupying 0.5 cubic feet. This would require a bearing computer, flush antenna and display instruments.

For bearing and distance, as tested in the current AF trials, distance can be measured from carrier phase only, without modulation, if the information is read continuously from start to end of trip. Bearing and distance computers, frequency reference standard and one flush loop and display instruments are needed.

Navarho-H would require bearing and distance computers, reference signal converter, two flush antennas and displays.

The hyperbolic-hyperbolic system, or Navarho H-H, would require signals from three transmitters. Two distance computers, two loop antennas and displays would be needed. Weight would be about 50 pounds and a cubic foot of space needed.

According to Rogoff, Navarho exhibits its greatest accuracy when operating in the hyperbolic-hyperbolic mode and five-mile accuracy over the entire service area would be obtained.

Data display, for the weight given, would be in the form of microsecond delay readings. A device to convert the hyperbolic fixes into latitude and longitude coordinates might be needed for some users.

Coverage possible

The 30-station network proposed by FTL would not offer complete three-station hyperbolic signals, but by station arrangement the North Atlantic could have such coverage.

Development of an airborne atomic-clock frequency standard and transistorization should make the system a strong contender for the U.S. answer to present ground-based, long-range radio navigation requirements, both military and civil.

A strong point in its favor is its compatibility with Vortac and Tacan short-range aids. Since it generates polar coordinates it could share a position computer or auto-navigator with the short-range aids and use the same display instruments.

At the ION meeting, William Tull, vice president General Precision Laboratory, disclosed the first specific figures on performance of his company's recently declassified RADAN APN-102 Doppler navigator, which weighs 88 pounds, and the much heavier APN-66, which Tull said "does everything."

APN-66 was revealed to be a four-beam system that transmits pulses in the "X" band at 8,800 megacycles and uses a mechanically stabilized rotating antenna system. It provides latitude and longitude information computed from ground speed, wind drift and magnetic compass information.

GPL has been accumulating data on its Doppler systems for a long time. Based on more than 400 flights over long distances, such as 1,000 miles and more, Tull said ground speed accuracy was better than 1.4% for 95% of the flights. Figures of 0.2% ground speed and 0.15 degrees drift angle accuracy are obtainable, he added.

For latitude and longitude computations, the magnetic reference system accuracy surprised many people, Tull said. Reading is within 0.2 of a degree. This is possible because the readings are integrated results rather than instantaneous. Previously, Tull noted, lack of wind information obscured the potential of magnetic compass accuracy.

When operating over water, system error is likely to increase. Instead of the accuracies given for ground speed and drift angle, these might be 1% and ±0.4 degree.

Beam width important

Smooth water is the worst condition and reduces signal return by a large factor. Width of beam is important, and for water a wide beam is preferable.

Ice behaves much like land. In response to a question on the effect of blowing snow, Tull said it had no effect on performance.

In response to a query on the effect of passing over a mountain or hills which the inquirer said "ought to throw the system off," Tull said that same theory is "why GPL is in the business and someone else is not."

Back in 1948 when GPL first started on Doppler, a certain authority who had been awarded honors for his work on Doppler contended that the mountain and hill effect would prevent full development of this navaid.

Accuracy of the RADAN system, developed by GPL as a ground speed, drift angle measuring system for possible airline use is within 1% of true ground speed and ±½ degree drift.

Tull told AMERICAN AVIATION that approximate cost of the RADAN would be $15,000-$30,000, depending upon specifications requested. Cost of a computer for position fixing would be about the same.

He said he expected Pan American World Airways would soon get two RADAN systems for airline evaluation, and other companies getting into the civil business would probably use GPL patents filed in the U.S. and Great Britain. Marconi Wireless Telegraph would probably work off of GPL patents, he added.

Dopplers are expected to be the first self-contained systems the airlines will use. Inertial systems are still under security wraps.

As things stand, the declassification of Doppler before inertial is prob-

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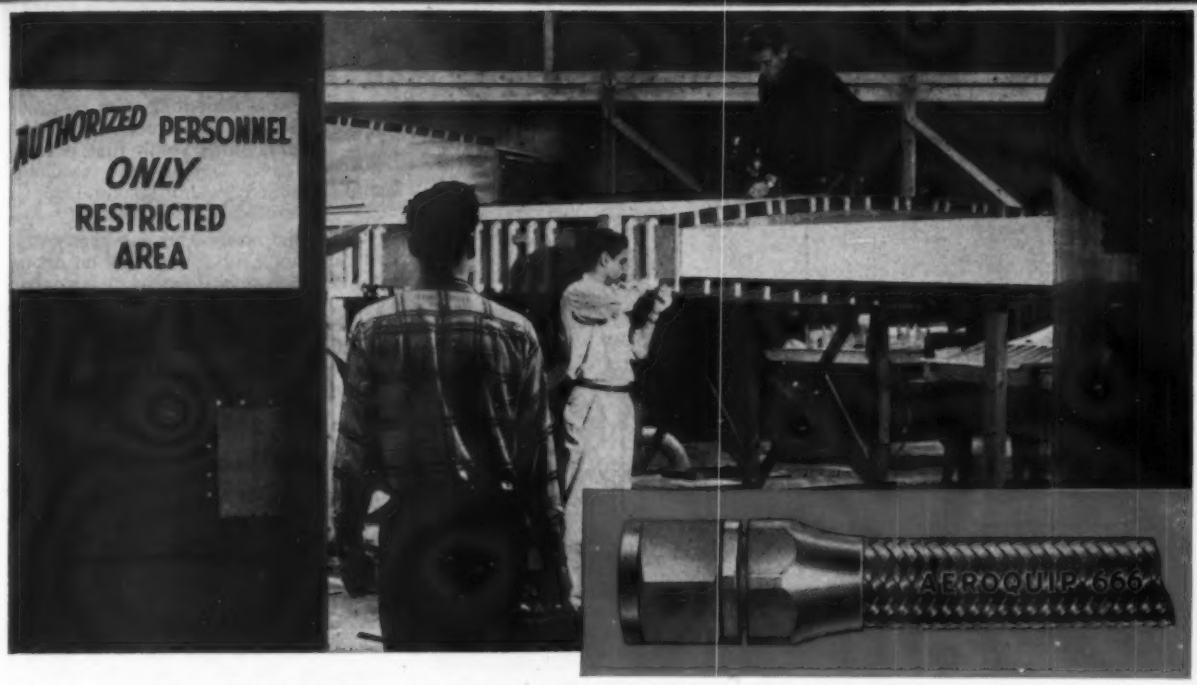

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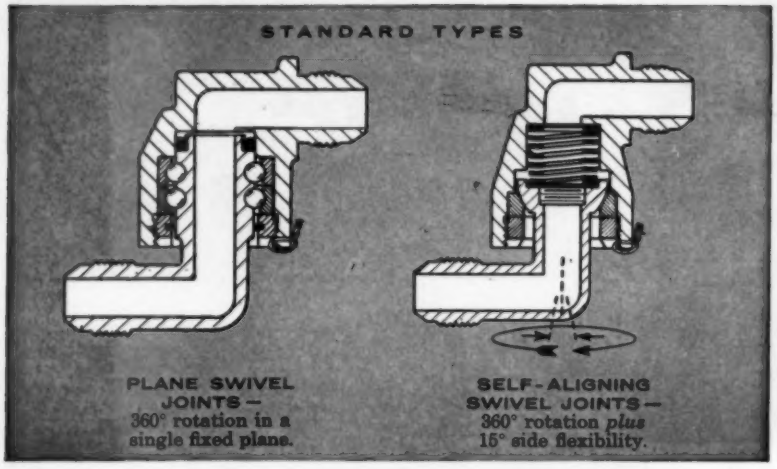
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ably a fortunate circumstance for the airlines.

An inherent characteristic of Doppler systems is their long-term accuracy as compared to instantaneous accuracy. It is the integrated result that is most accurate; and lacking any available ground radio checking system Doppler can find immediate usefulness.

Inertial systems are inherently capable of much more accuracy on an instantaneous measurement basis than long-term. Their long use over hours results in an accumulation of errors. If inertial systems were available for the airlines, a radio-fixing system need would probably be a much more critically needed item.

Radio astronomy navigation

Revelation that another system of navigation will soon be added to those under development by the Navy for its Polaris missile program was made by Capt. L. L. Schock, Special Projects Office, Bureau of Ordnance, USN.

Schock said the advent of such a missile has changed the role of the navigator. He must now be able to know where he is with pinpoint accuracy under all weather conditions.

To help do this, Sperry has produced the SINS (ship inertial navigation system) which has been undergoing trials on the USS Compass Island, the Navy's missile ship laboratory. Recently installed on board the Compass Island was a celestial tracker for ultra-precise star navigation.

Now, the Navy intends to add another navigation aid known as radio astronomy. Work has been under way for years at the Naval Research Laboratory to measure and identify radio energy emission from various stellar bodies.

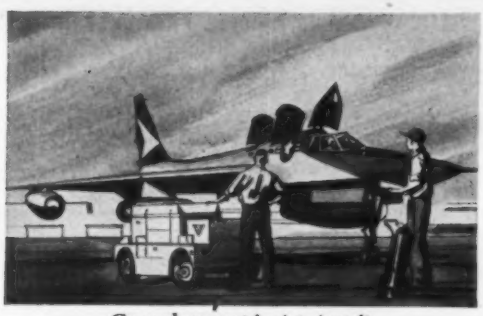
Dr. John P. Hagen, now director of Project Vanguard, is credited with pioneering work on radio astronomy. Apparently Hagen and his associates in this field have now learned enough about astronomical radiations to use them as position-fixing information for earth navigation.

The spectrum and intensity of radiation is reportedly different from various stellar bodies, but signal strength is very low. Work on radio astronomy has generally required very large parabolic antennas with enough area to capture usable signals.

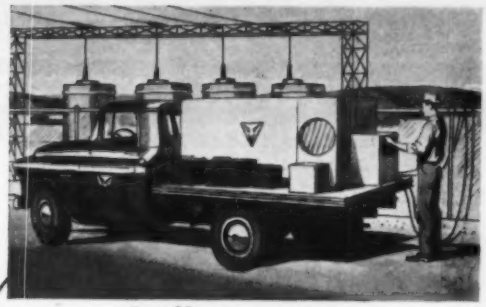
According to Schock, the antenna size can now be reduced enough to make it practical for shipboard installation.

Early next year, the Compass Island will begin to evaluate the new radio astronomy navigation technique which Schock says is a "breakthrough" to celestial navigation capability under a complete overcast.

The evaluations of Compass Island equipment is expected to guide the Navy in development of an optimum submarine navigation system as well as for surface vessels, Schock stated.



Ground support for jet aircraft.



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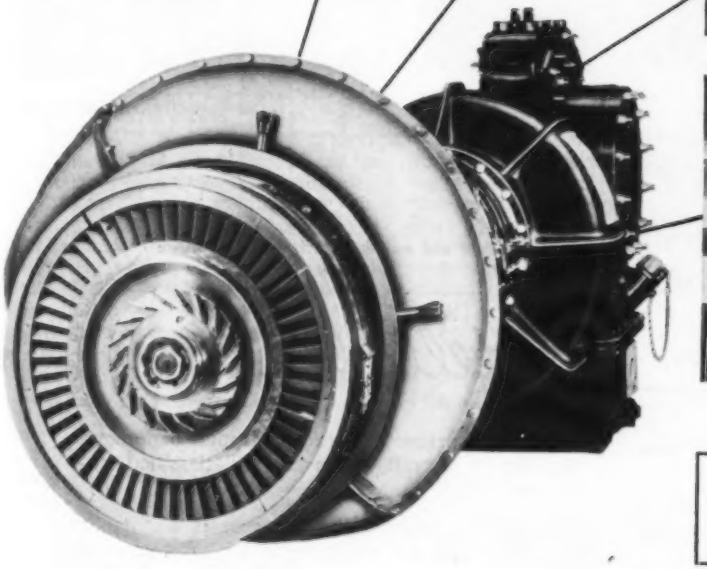

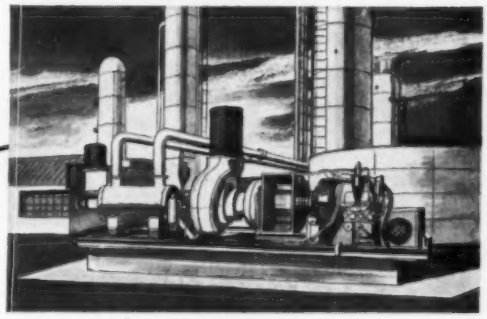

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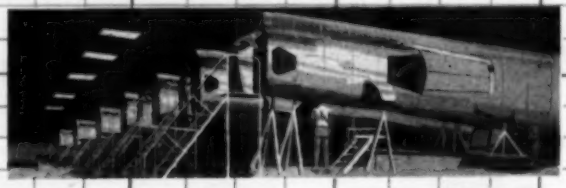

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FENWAL INC., Aviation Products Division, is producing a line of fire extinguishing systems for aircraft.

System consists of high-rate discharge bottles that can be charged with any of the commonly-used extinguishing agents. It contains indicators which show whether container has been discharged because of either excessive operating temperatures or pilot operation. First application is in F-27 Friendship nacelles.

Circle No. 110 on Reader Service Card.

Stepping motor

Completely balanced high-performance bi-directional stepping motor meeting all shock and vibration standards has been introduced by NEMETH, INC.

Output shaft locks in place after each actuation, cannot be rotated by external forces. Angular accuracy $\pm\frac{1}{2}°$; torque 5 in. oz. in 1½x2½" motor.

Larger sizes have correspondingly larger outputs.

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Optical tracking system

PERKIN-ELMER CORP. has built what it describes as the first completely mobile tracking system capable of photographing an object 2"x7" at an altitude of four miles.

Called the Telescopic Photographic Recorder, the 6-ton system will record documentary information such as altitude data, spin rates and correlated time data. It will be used to photograph flight of missiles, aircraft and bombs at Eglin AFB, Fla.

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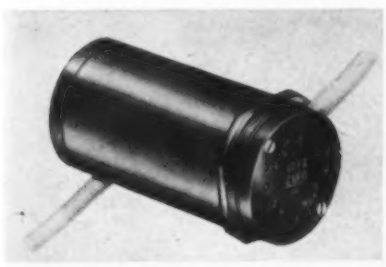
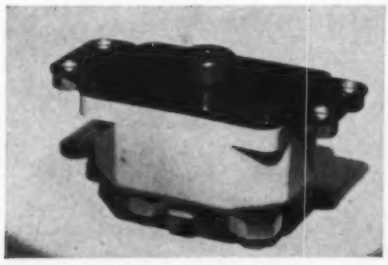


Subminiature floated gyros

REEVES INSTRUMENT CORP. is producing a series of high-precision floated integrating gyros designed for use in missiles and other airborne equipment. Measuring 1" in diameter, the gyros are fully floated to keep friction and uncertainty torques to low level.

Power requirement is less than 1/3 watt, connections made through 11 pin-plugs at each end of gyro. Total weight, exclusive of connectors, is 3¾ oz.

Circle No. 113 on Reader Service Card.



Heavy duty circuit-breaker

METALS AND CONTROLS CORP. is manufacturing a weatherproof, precision type, heavy-duty circuit-breaker for use in aircraft and other applications requiring precision, high shock and vibration-resistant units.

Weighing 7.5 oz., breaker has snap-acting disc actuating element. Ratings range from 105 to 200 amperes. Automatic and manual reset types operate at predetermined current overload.

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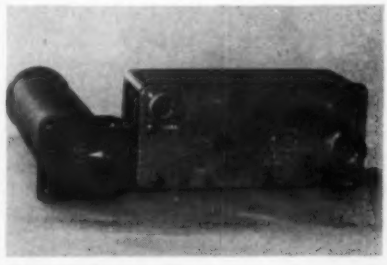

Temperature indicator

HANDLEY ELECTRONICS CO. is producing a new direct-reading temperature indicator said to be 1/30th the size of any previous equivalent for use in military and commercial airplanes being flight tested at Douglas Aircraft Co., Inc.

Indicator is a self-balancing potentiometer designated N1-10.

Readings are recorded by photograph; which also records various other instrument readings at the same time.

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in Cessna's T-37 jet trainer
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a quicker, easier transition into combat jets!
Other features—high-altitude performance
and high to low speeds
with easy handling.
USAF saves training time,
money!

CESSNA AIRCRAFT CO., WICHITA, KANS.

Cessna

Beech's Travel Air in volume production

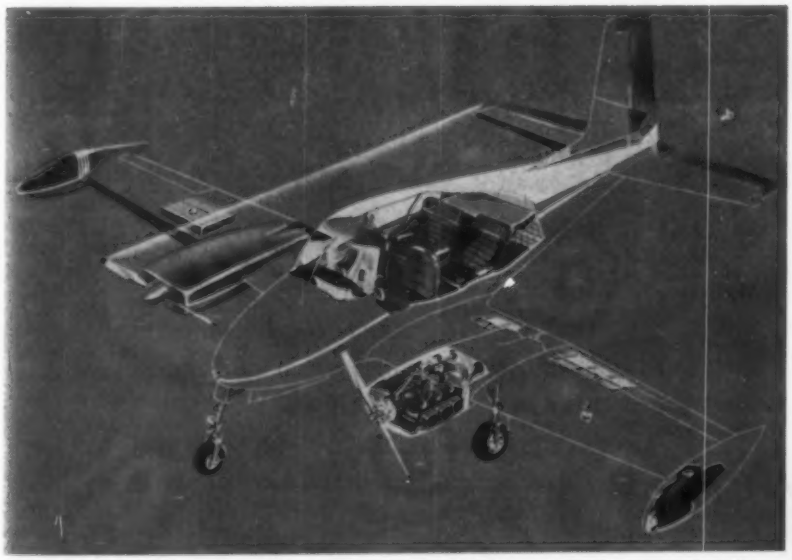
Beechcraft reached back to the mid-twenties and resurrected the Travel Air label for the latest in a long line of business aircraft designs. This light twin-engine Beech Model 95 was certificated June 18, and the company announced that volume production will commence immediately.

The Travel Air will have two Lycoming 180 hp engines, with performance claims of 208 mph top speed and 200 mph cruise. The tricycle landing gear will have Beechcraft air-oil struts on all wheels which will withstand shocks created by a vertical descent component of 600 feet per minute. The nose wheel is equipped with a shimmy dampener and is steerable.

Complete adaptability of the Travel Air to both civilian and military requirements was the engineering goal of Beech, and they claim to have in this model the "quietest twin-engine airplane in the world." The Hartzell continuously variable pitch propeller is said to be practically free of vibration.

In demonstrations for the Army at Fort Rucker the Travel Air was flown at 200 mph about 30 feet off the runway, one engine was feathered and the plane was pulled up into a precision roll . . . into the dead engine. Takeoff rolls of 150 yards have been demonstrated, but design takeoff roll at maximum weight of 4,000 pounds is 850 feet.

Cessna 310B features new instrument panel



REGROUPING OF INSTRUMENTS and functional location of accessories shown in artist's sketch, are features of Cessna 310B. Use of thicker glass, addition of 21 lbs. of soundproofing material, and sealing of all small openings have cut the noise level in the cabin. Five-outlet oxygen console has been added to equipment.

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Airlines need 6% fare increase, "or else . . ."

Wall Street sources say that carriers may face financial chaos unless CAB becomes realistic

by William V. Henzey

While airline attorneys continued last week to shatter exhibits of the Civil Aeronautics Board staff at hearings in the Suspended Passenger Fare Case, the word came out of Wall Street that the airlines need a proposed 6% fare increase, or else.

The "or else" takes several forms. For those carriers that have not yet completed financing arrangements for the jet age, Wall Street says "they may be over a barrel." Much more forceful is the conclusion that the industry may be facing "a degree of financial chaos as occurred during 1946-48, unless CAB adopts a more realistic attitude."

Wall Street in this case is the research department of Pyne, Kendall & Hollister, New York brokerage firm, whose Edward V. Mayer prepared a detailed confidential field report on the industry for the firm's clients. Special permission has been granted AMERICAN AVIATION to draw from that report such factors as indicate the financial world's view of the fare struggle now going on between the airline industry and the Government.

Mayer reconstructs the industry's position and arrives at this word of advice to clients: "Generally speaking, those who purchased airline securities 11 or 12 years ago have fared poorly, and with few exceptions the price now is lower. Over the near term, at least, we expect airline shares to perform below average in relation to the D-J (Dow-Jones) Industrials." Why?

For one thing, noting the "current earnings squeeze," Mayer states:

"The broadening competitive struggle among airlines will bring a sizable reduction in the passenger load factor during 1957, possibly continuing into 1958, while at the same time the breaking in of so many new routes involves heavy special expense.

"New equipment tends to improve operating efficiency, but on the other hand various cost factors, such as labor, gasoline material, airport costs, depreciation and interest charges are in a rising trend. Some of these items are rising sharply.

"With the break-even point moving up while the load factor is declining, the airlines are in for a double squeeze on earnings and the shrinkage is likely to be greater than is generally anticipated. In our opinion, the 1957 vs. 1956 drop in earnings from operations, excluding capital gains, stands to be at least 50%."

May complicate equipment plans

Weighing those conclusions with the industry's capital requirements, Mayer continues: "This deterioration in earnings may complicate the matter of heavy capital requirements in connection with the heavy 1957-61 re-equipment program. It is authoritatively estimated that during the 1957-61 period, capital expenditures for aircraft may approximate $1,800-1,900 million and commitments to enlarge and improve ground facilities may boost the figure by over $250 million. Cash throw-off from depreciation may approximate $800 million.

"Recent financing arrangements of various airlines cover around $750 million, which leaves a balance of roughly $550 million. Some of this will be obtained from equipment sales and some from retained earnings but, for the most part, this balance must be procured in the capital markets. One also must take into consideration, the growing needs for working capital of an expanding business.

"With the tight money situation, superimposed on an unfavorable earnings picture, those airlines which have not yet completed all financing arrangements may be over a barrel, unless a rate increase comes out of the CAB hearings now in progress."

Mayer's report goes into great detail to produce the conclusions advanced.

Meanwhile, keeping the financial world's viewpoint in mind, the modesty or insufficiency of the airlines' proposed 6% increase becomes apparent. For only about $70 million, or about one-eighth of the $550 million needed, would result annually if the 6% boost is adopted by all trunklines. In short, the fare increase won't solve the industry's problems, it can only encourage the investment of sources of capital which otherwise will not be available.

On another front in the fare war, the stormy hearings in the CAB fare case continue to add emphasis to the belief that the CAB staff first concluded it would oppose the 6% fare increase and then sought to develop data to support the conclusion.

Two new policies

Most alarming developments to the industry in this regard have been the adoption by the staff of two new policies which contribute most to the staff's conclusion that 1957 will be a rosy year for the airlines.

One of the policies has to do with depreciation. CAB witnesses have admitted a new depreciation policy was adopted *after* the 6% fare case was instituted. What's more, witnesses have admitted to a degree of flexibility in application of this policy unique in the history of CAB proceedings.

For example, if the staff's new de-

The effect on individual passengers of a proposed 6% fare increase is so slight as to be non-recognizable, particularly when compared with what passengers paid prior to the reduction from 15% to 10% in the transportation tax on April 1, 1954.

For example, a New York-Chicago one-way coach passenger would pay 55¢ more under the proposed higher tariffs than his trip cost him three and one-half years ago. Similarly, the Chicago-Detroit coach passenger would pay 15¢ more if the fare hike is approved by CAB, or approximately the pre-inflation price of getting one shirt cleaned.

Following table illustrates total charges to the public in selected markets for the period before the airline industry embarked upon its $2.3 billion re-equipment program and proposed new total charges, if the 6% fare increase is approved:

	Present OW fares with old 15% Tax		Proposed OW fares with current 10% Tax		Amount of Increase	
	1st Cl.	Coach	1st Cl.	Coach	1st Cl.	Coach
Chicago-New York	$ 51.85	$ 37.95	$ 52.60	$ 38.50	$0.75	$0.55
New York-Los Angeles .	182.65	113.85	185.20	115.45	2.55	1.60
Boston-Washington	29.40	22.45	29.80	22.80	0.40	0.35
Chicago-Detroit	18.70	12.65	19.00	12.80	0.30	0.15

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preciation policy is more in support of the carrier's position than the staff's, it is not applied. This was brought to light by Braniff Airways' attorney B. Howell Hill, who noted that Braniff's own Douglas DC-7C depreciation figures are adopted by the staff although Braniff's DC-6 depreciation estimates are revised downward by the staff.

Generally, the new staff policy calls for piston-engined aircraft to be written off in seven years with a 25% residual value. General industry practice has been to use a 5% or 10% residual value and write off the balance in four or five years. In some cases, for tax purposes, the Bureau of Internal Revenue permits depreciation up to a "zero" residual, meaning the entire value of the property may be written off as an expense item.

The other policy causing particular disturbance involves a refusal to include in a carrier's investment base the millions of dollars which have been deposited with aircraft manufacturers for new airplanes. Such an understatement of a carrier's investment base results in a serious overstatement of the carrier's return on investment. Thus it is that the CAB staff predicts the airlines will realize returns on investment in 1957 in the neighborhood of 20%, whereas industry estimates range from zero to 10%.

No decision on testimony

There was still no decision by Examiner Ralph L. Wiser at presstime on the possible striking from the record of key testimony and exhibits of the staff. That situation stems from the inability of CAB Rates Chief Harry H. Schneider to answer questions concerning internal CAB matters. Schneider's insistence that he had no authority to answer such questions was backed up by a formal Board ruling in late June.

Wiser has ruled that the questions involved are "legitimate cross-examination," but he has deferred a ruling on United Air Lines' motion to strike testimony and exhibits.

Industry reaction to the controversial CAB staff exhibits was apparent in this statement issued early this month by Capital Airlines' assistant vice president-finance, S. B. Goldthorpe:

"The construction of profits . . . as has been done by (CAB) Bureau Counsel, is an extremely dangerous bit of manipulation which completely distorts the true financial condition of the Company. It reports low taxes and high profits (and high return on investment) . . . This tax calculation, together with other arithmetical manipulations clearly demonstrates the extremes that have been used in Bureau Counsel's presentation to create an illusion that Capital's financial results are vastly better than the facts of the case will sustain.

". . . Capital's earnings from operations have been marginal for years and in the immediate past period it has sustained very heavy losses, its cash balances have been declining at a time when cash demands for the amortization of equipment debt are rising and no amount of accounting or arithmetical tinkering or theoretical compromise can alter these basic facts which justify, beyond question, the fare increase which Capital has proposed."

EAL seen as winner of NY-Mexico City route

Civil Aeronautics Board is reliably reported to have voted for Eastern Air Lines to be the U.S. carrier on the coveted New York/Washington-Mexico City route. This was the latest in a series of fast-moving developments at presstime as the four-month old U.S.-Mexico air agreement edged closer to full implementation.

Eastern and Pan American World Airways are applicants for the New York/Washington-Mexico City route in which only one U.S. carrier may be selected. CAB's reported recommendation in favor of Eastern is still subject to final decision by President Eisenhower. Previously, CAB Examiner Edward T. Stodola had recommended PAA for the route.

Meanwhile, the fight between American Airlines and Braniff Airways for the U.S. authorization to operate the Chicago-Mexico City route is entering the final stages with a CAB oral argument scheduled for July 25. CAB Examiner Joseph Cannon recommended American for the route.

Mexican applicants for those routes also became active at presstime with applications to CAB for necessary foreign air carrier permits. Aeronaves de Mexico, S. A. applied for New York/Washington-Mexico City and New Orleans-Mexico City. Compania Mexicana de Aviacion, S. A., currently operating the Los Angeles-Mexico City route applied for Chicago-Mexico City and San Antonio-Mexico City. CAB is expected to process the Mexican applications expeditiously.

CAB rejects bid for early AA hearing

Civil Aeronautics Board has turned down bids of American Airlines and the City of San Francisco for expeditious hearings on AA's application for San Francisco-New York nonstop rights. But the Board directed its staff to "review the problem of the air service pattern between New York and San Francisco and report the results of that study to the Board on or about December 1, 1957."

Thus, the agency appeared to ward off a new major route case for at least six months. In rejecting bids for early hearings, CAB said proponents had "not established any justification for departing at the present time from the general practice of the Board of assigning hearings on applications for new or additional air service in the order in which they are filed . . ."

Advertising costs 'Big Four' up to 70c per passenger

Percentages of international carriers' revenues spent for promotion higher than domestic, survey shows

by Eric Bramley

The four largest U.S. domestic airlines last year spent from 44.6c to 69.5c per passenger carried to buy advertising space. For each revenue passenger-mile, this advertising expenditure ranged from a low of 7/100 of a cent to a high of one mill.

These figures were among the results of an analysis made by AMERICAN AVIATION of Civil Aeronautics Board reports for 1956 to determine what percentage of revenues the airlines use to attract and develop business through advertising and publicity, give service to passengers and operate traffic and sales departments.

Five smaller trunklines were in the same general range as the Big Four (American, United, TWA and Eastern) in advertising expense per passenger. However, with shorter hauls, their expenditure per passenger-mile was higher.

Two trunks were considerably higher on a per-passenger basis.

The analysis also showed that in 1956:

The Big Four spent from 1.3% to 1.9% of their passenger revenues to buy advertising space and from 2.7% to 3.5% for all advertising and publicity purposes. Smaller carriers' percentages were generally higher.

On traffic and sales activities, the Big Four spent from 9.3% to 11.4% of their passenger revenues and from 8.8% to 10.5% of their transportation revenues.

The latter include revenue from mail, express and freight, but do not include subsidies.

For passenger service, the Big Four ranged from 6.9% to 7.9% of passenger revenues, while other trunks covered a wider spread, from 5.5% to 9.2%.

Percentages of international and overseas revenues spent in the above categories were higher than domestic. And with the smaller number of passengers carried, expense per passenger for advertising was substantially more.

Following is a description of the CAB accounts used in the analysis:

Advertising Space: Cost of all space (only) intended to increase air travel, disseminate air travel information, and publicize services. Includes newspapers, all magazines, directories, guides, etc. Not covered are cost of cuts and mats and cost of producing ad copy. Also not included are salaries of employes engaged in producing ad copy and related activities.

Advertising and Publicity: All expenses incurred to create public preference for the airline and its services, promote use of air transport, and stimulate development of the air transport market. Includes advertising space and "other advertising" (calendars, air mail and baggage stickers, billboards, maps, direct mail, displays, films, etc).

Traffic and Sales: All sales, ticketing and reservations expenses. Includes salaries and expenses of personnel primarily engaged in selling transportation, processing passengers on ground, soliciting traffic, issuing tickets, reserving space, scheduling flights and preparing and issuing tariffs.

Passenger Service: Expenses incurred in providing meals, sleeping accommodations, and other facilities and services contributing to comfort, safety and convenience of passengers while in flight; also passengers' interrupted trip expense, passenger liability insurance, injuries, loss and damage expenses in excess of insurance coverage.

Comparison of Revenue Spent by U.S. Airlines for Advertising, Sales and Service—1956

Company	Adv. space expense per: Rev. Pass. (¢)	Rev. Pass. Mile ($)	For adv. space % Pass. Rev.	% Tr. Rev.	For adv. & publicity % Pass. Rev.	% Tr. Rev.	For traffic & sales % Pass. Rev.	% Tr. Rev.	For Pass. Service % Pass. Rev.
American	44.6	.0007	1.3	1.2	2.7	2.4	11.0	9.9	7.0
Braniff (dom.)	42.2	.0010	1.8	1.7	3.2	3.0	10.4	9.6	8.4
(int.)	568.0	.0026	3.4	2.9	6.8	5.6	13.9	11.6	9.4
Capital	49.7	.0014	2.5	2.3	4.0	3.7	14.2	13.4	9.2
Continental	40.5	.0011	1.8	1.6	3.8	3.5	6.8	6.3	7.1
Delta[1]	60.3	.0012	2.2	2.0	(dom.) 3.6	3.3	10.7	9.8	6.5
					(int.) 2.7	2.5	13.0	12.0	6.9
Eastern (dom.)	51.0	.0010	1.9	1.8	2.7	2.5	9.3	8.8	6.9
(int.)	109.0	.0008	2.0	1.9	2.8	2.6	4.7	4.3	5.9
National (dom.)	97.7	.0014	2.8	2.5	4.5	4.1	11.6	10.6	5.5
(int.)	173.0	.0030	5.1	4.7	7.2	6.6	16.1	14.8	7.3
Northeast	21.6	.0010	1.6	1.5	3.8	3.6	14.2	13.4	7.6
Northwest (dom.)	85.3	.0013	2.5	2.2	2.9	2.6	9.8	8.8	7.2
(int.)	100.0	.0005	0.8	0.4	5.7	3.3	16.1	9.5	7.8
TWA (dom.)	69.5	.0009	1.8	1.7	3.5	3.2	11.4	10.5	7.9
(int.)	142.0	.0005	0.8	0.6	5.7	4.5	18.7	14.8	8.7
United[1]	47.4	.0007	1.3	1.1	(dom.) 2.7	2.4	11.4	10.1	7.6
					(int.) 2.8	2.6	12.1	11.4	8.3
Western	65.8	.0013	2.3	2.2	3.6	3.4	10.3	9.7	8.9
PAA (Latin Am.)	86.4	.0009	1.7	1.3	5.3	4.1	17.7	13.7	10.6
(Atlantic)	209.0	.0016	2.2	1.7	5.5	4.3	14.8	11.8	8.9
(Pacific)	271.0	.0009	1.5	1.1	4.6	3.5	14.9	11.1	10.1
(Alaska)	33.7	.0003	0.6	0.4	4.7	3.3	18.0	12.8	13.2
Panagra	420.0	.0035	4.1	3.3	7.6	6.2	15.1	12.1	6.8

NOTE:

[1] *Delta and United do not separate advertising space expense of domestic and overseas operations.*

[2] *Expenditures listed above (except passenger service) are compared with total transportation revenues (which include cargo and mail revenues, but not subsidy) because a small amount of such expenditures would be applicable to cargo and mail. Because a very high percentage of expenses in all four accounts would be attributable to passengers, all are compared with passenger revenues.*

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4. Longer future—this decision must be taken eventually by all progressive airlines. Of turbo-prop investments the Eland offers the surest dividends.

PISTON v. TURBO-PROP

As piston engines wear out airline operators may decide to replace with new Eland-powered craft. From a financial point of view, however, it may be that *conversion* is the better proposition; it has been estimated that a Convair 340 conversion operating over stage lengths of 200 miles with a utilisation of 3,000 hours per year and a load factor of only 65% would show a profit increase of $100,800 per year over the piston engine version. On routes with stage lengths of 800 miles a fleet of 20 Eland Convairs in similar conditions would show more than $3,000,000 extra profit annually. These are figures no airline operator can ignore.

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European airlines move toward U.S. efficiency standards

Operating results improve during 1955-56, Air Research Bureau study shows, but staff productivity remains low

by Anthony Vandyk

ALTHOUGH INEFFICIENCY still plagues European airlines, they are gradually making improvements. Still a long way from U.S. standards, the European operators, nonetheless, have made some real progress in the last two years.

On December 5, 1955, AMERICAN AVIATION published excerpts from a report prepared by the Air Research Bureau, the European airlines' own organization, pointing up the inefficient situation. A recent report by ARB, entitled "Comparison Between the Development of Air Transport in Europe and in the United States," is more encouraging.

ARB, which includes most of the major European carriers offering intra-European services, points out that domestic fares there are at the same level as U.S. domestic fares. The average international fare, however, is 7% higher than U.S. international fares.

In terms of speed, European schedules are "not significantly lower" than those of U.S. operators. Standards of flight equipment of European and U.S. carriers are regarded as "equal" but the re-equipment program is seen as more extensive for Europe than for the U.S.

In Europe, the switch to turboprop and jet planes is proceeding rapidly—much faster than in the U.S. Rate of traffic growth is higher than in the U.S. although European traffic volume is only 16% of that of the U.S.

On the negative side, staff productivity among European airlines is "much lower" than in the U.S. but is improving at the same rate as among U.S. domestic carriers. Operating costs are higher in Europe but are related to the difference in costs between international and domestic operations. Cost reductions have been taking place at the same rate in recent years in both the U.S. and in Europe.

ARB observes that aircraft utilization in Europe is lower than in the U.S. but is improving. Frequency is lower—an average of nine roundtrips per week compared with 28 per week in the U.S. Unduplicated route mileage is about half that of the U.S. Total number of airports used in Europe (166) for regular airline operation is about one-third of the number in the U.S.

Comparing Europe and the U.S. in general terms ARB notes that Europe's land area is 43% smaller but its air space is about the same. Europe's population is greater than that of the U.S. —330 million compared with 162 million. Industrial production is similarly concentrated on both sides of the Atlantic, insofar as the main industrial areas are concerned, but subsidiary producing regions are closer to the main area in Europe.

An important key to the overall situation is national income per capita and the standards of living. European incomes and standards are, of course, much lower—the average national income per capita is $536 in Europe against $1,830 in the U.S. Another important factor in comparing European and American air transport is surface transport competition with the airlines. In Europe road and rail facilities are half those of the U.S.

Lack of frequency in the operation of intra-European services has always been emphasized as a great deficiency, ARB notes, particularly when comparing the situation with the U.S. Statistical analysis and research have shown average frequency in intra-U.S. services as 10 times greater than that of intra-European services. The reason for this great difference is, however, to a large extent caused by a different basis for the calculation of the length

Single fares on typical U.S. and European domestic routes. (Winter 1956/57)

	Class	Stage distance miles	Single fare (dollars)	Cents per Pass.-km.
UNITED STATES:				
Los Angeles-San Francisco	C	325	13.50	2.58
New York-Washington	C	215	11.40	3.31
Dallas-Houston	S	241	15.90	4.10
Chicago-St. Louis	S	250	16.55	4.10
New York-Buffalo	S	291	19.40	4.13
Minneapolis-Kansas City	S	420	29.45	4.37
EUROPE:				
Helsinki-Kemi	S	388	15.50	2.40
Madrid-Barcelona	S	300	15.60	3.23
London-Glasgow	T	327	19.80	3.77
Stockholm-Gothenburg	S	249	16.40	4.10
Milan-Rome	S	300	20.00	4.28
Paris-Marseilles	S	390	28.80	4.59

S = Standard
T = Tourist
C = Coach

Single fares per pass.-km. (Grand Circle distance) (Winter 1956/57)

Europe	Cents per pass.-km.	U.S.	Cents per pass.-km.
Amsterdam-Zurich	4.33	Houston-Mexico City	3.33
Rome-Madrid	4.36	Los Angeles-Mexico City	3.93
Rome-Paris	4.78	New York-Toronto	4.19
Lisbon-Paris	5.11	New York-Montreal	4.41
Stockholm-Copenhagen	5.27	New Orleans-Guatemala	4.43
London-Nice	5.33	Chicago-Toronto	4.47
London-Oslo	5.65	Minneapolis-Winnipeg	4.59
Zurich-Rome	6.02	Seattle-Vancouver	4.61
London-Amsterdam	6.16	Miami-Havanna	5.32
Copenhagen-Frankfurt	6.60	New Orleans-Havana	5.56
Athens-Cairo	6.70	Miami-Kingston	6.23
Rome-Athens	8.15	Miami-Caracas	6.52

Number of aircraft and hours flown (average utilization)

	U.S. carriers			European carriers		
	No. of aircraft	Hours flown (000's)	Average utilization hours/year	No. of aircraft	Hours flown (000's)	Average utilization hours/year
1951	1,121	2,666	2,380	554	852	1,550
1952	1,227	2,899	2,360	611	929	1,520
1953	1,300	3,165	2,430	638	964	1,510
1954	1,336	3,191	2,390	602	1,017	1,690
1955	1,397	3,497	2,500	610	1,105	1,810

Available ton-kms, number of employes & number of available ton-kms/employe

	U.S. carriers			European carriers		
	No. of available ton-kms. (000's)	No. of employes (000's)	Available ton-kms. per employe	No. of available ton-kms. (000's)	No. of employes (000's)	Available ton-kms. per employe
1951	3,880	96	40.3	1,089	69	15.8
1953	5,505	106	51.8	1,459	77	19.0
1955	7,290	126	57.8	1,938	86	22.5

of the unduplicated route mileage, ARB explains.

In Europe the normal principle used is to add together all the sectors operated, while in the U.S. the unduplicated route mileage is represented by the length of the certificated routes granted by the CAB. This has led to wrong conclusions with regard to the character of the European route network.

The length of the certificated routes in the U.S. is only half the unduplicated route mileage in Europe. Thus it has been frequently said that European air network is over-extended with too many point-to-point links. However, if the length of the U.S. route network were calculated on the same basis as the European network, the unduplicated route mileage on the U.S. continent would be shown as nearly twice that of Europe. Instead of the relationship one to ten, a comparison made on an equal basis indicated the relationship of one to three.

ARB says a higher frequency could be obtained in Europe by operating smaller aircraft but the demand for lower operating costs supports the use of larger equipment. Furthermore, ARB notes, U.S. aircraft manufacturers are the main suppliers to the world market and have progressively increased the size of aircraft to meet the requirements of their most important customers, the U.S. domestic carriers.

Consequently, European carriers have been obliged to operate larger aircraft to provide the most up-to-date equipment. Lack of improvement in the frequency of operation in Europe is therefore a consequence of European operators' renewal of their fleets by substituting modern equipment such as Convairs, DC-6s and the Viscounts for non-pressurized types such as the DC-3, DC-4 and the Viking. Recently there has been a rising trend in frequencies.

Cooperative arrangements help

An important improvement in the scheduling and the effective number of frequencies offered to the public, which cannot be recorded in any average, is the extent of coordination between European carriers which has taken place in recent years by pooling or other cooperative arrangements. Pool traffic increased from 19% in 1951 to 29% in 1955 of the total traffic of ARB carriers. Schedules of the airlines have been coordinated in order to obtain a better spread over the week and over the day, thereby taking full advantage of the high-frequency operation. ARB notes that this type of coordination between carriers does not exist in the U.S.

While U.S. carriers were ahead of European airlines in ordering piston-engines powered equipment, European carriers were quick to follow in all cases where the equipment offered met their traffic requirements. Regarding turboprop equipment however, the Europeans were the first to introduce this type of aircraft into regular service.

European carriers currently have an extensive re-equipment program which in capacity represents about 160% of the total production in 1956. This contrasts with the U.S. airlines re-equipment program representing 110% of present capacity. As a result, ARB says that in 1961 the European carriers will operate more than half of their traffic with the turbine aircraft, whereas U.S. aircraft will still be relying on reciprocating types for major parts of their total production.

In terms of speed the European airline services are improving rapidly. While the average speed within the U.S. for the past four years has increased by 11%, intra-European traffic has shown an improvement of some 20% and is now only 10% below the average for the U.S. domestic trunk operation.

However, total travel time in Europe tends to be slower than in the U.S. because of lengthier airport time in Europe, where customs and passport formalities usually have to be accomplished. Furthermore, in Europe surface communications with airports are generally of a poorer standard than in the U.S., notwithstanding the high density of road traffic in the U.S.

ARB says the contention that European operations do not make money is far from the truth. For example, British European Airways is now able to make a profit on its total operations which include short-stage domestic services. Ireland's Aer Lingus,

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with an average stage distance of 220 miles, made a small profit in 1955/56, and Finnair is also making a profit. Each of these three airlines operates exclusively within the European continent.

Although it is more difficult to separate the European from the total operations of those European carriers which also operate intercontinental services, ARB says that, nevertheless, a large number of European routes are now profitable and that the airlines operating them are doing so at, or close to, break-even, with a full allocation of overheads to their European activities.

Summing up, ARB says the high rate of development of European traffic points to the fact that the European operation is in an earlier stage of development than the U.S. Europe offers the prospect of a higher rate of development in the future, whereas in the U.S., the primary stage of development is now passed. Therefore, prospects of European carriers are favorable for the achievement of a high rate of expansion and ultimately the difference between the size and efficiency of operations should only be those resulting from those basic geographical, economic and political differences between the two regions.

Fuel additive boosts Turbo Compound's power

Turboprop-powered aircraft now under development may soon have to vie with new Turbo Compound engines which the Ethyl Corp. says can have 20% added power through use of a newly devised additive to aviation gasoline.

Called AK-33X, an organic compound of manganese, the additive is used to supplement the anti-knock action of tetraethyl lead.

On the basis of tests on an 18-cylinder Turbo Compound engine run at Curtiss-Wright's Wood-Ridge, N. J., plant, C-W chairman and president Roy T. Hurley said that Turbo Compound engines now in service in Lockheed Super Constellations and Douglas DC-7s can immediately benefit through the additive's capacity to increase detonation margins and thus improve combustion chamber efficiency and extend cylinder life.

Aircraft powered by new Turbo Compounds, specifically designed to make best use of AK-33X, are expected to be thrust into the 400-mph cruise performance range of turboprop aircraft now being designed.

Ethyl board chairman E. L. Shea emphasized that although the additive is still in the R&D stage, the advance is being revealed at this time in order to further the development of aircraft piston engines, and to advise refiners who make aviation gasoline of the possibilities of AK-33X.

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Summary of U.S. airline revenues and expenses for quarter ended March 31, 1957 vs. quarter ended March 31, 1956

Compiled by American Aviation Publications from Official C.A.B. Data.

Airlines	Total Operating Revenues 1957	1956	% Change	Passenger Revenues 1957	1956	% Change	Total Operating Expenses 1957	1956	% Change	Net Operating Income 1957	1956	% Change
DOMESTIC												
American	$ 68,993,819	$ 62,486,843	10.4	$ 61,214,259	$ 55,733,643	9.8	$ 67,054,782	$ 57,157,660	17.3	$ 1,939,037	$ 5,329,183	—63.6
Braniff	12,342,426	10,535,833	17.1	11,407,353	9,707,347	17.5	12,008,825	9,822,365	22.3	333,601	713,468	—53.3
Capital	19,269,371	11,872,867	62.3	18,272,292	10,909,744	67.5	20,261,598	13,403,833	51.2	—992,227	—1,529,966	...
Continental	4,657,120	4,401,516	5.8	4,147,865	3,720,176	11.5	4,396,646	4,137,487	6.3	260,474	264,029	—1.4
Delta	19,521,623	16,525,953	18.1	18,039,612	15,055,082	19.8	18,108,344	14,128,101	28.2	1,413,279	2,397,852	—41.1
Eastern	66,820,424	58,724,217	13.9	62,783,051	55,223,895	13.7	59,855,581	46,024,288	30.1	6,964,843	12,699,929	—45.2
National	17,378,685	17,262,997	0.7	15,930,806	15,838,549	0.6	14,592,294	12,947,380	12.7	2,786,391	4,315,617	—35.4
Northeast	2,654,621	1,956,558	35.7	1,922,908	1,349,461	42.5	3,498,358	2,308,877	51.5	—843,737	—352,319	...
Northwest	10,429,455	10,816,301	0.1	9,427,531	9,482,552	—0.6	12,248,291	11,755,692	4.2	—1,418,836	—939,391	...
TWA	41,533,705	37,355,088	11.2	36,493,455	33,691,837	8.3	45,584,939	40,171,039	13.5	—4,051,234	—2,815,951	...
United	57,502,753	54,267,993	6.0	50,514,064	47,354,494	6.7	59,207,817	53,432,689	10.8	—1,705,064	835,304	...
Western*	9,362,083	1,403,675	...	8,678,650	1,282,151	...	8,322,680	2,980,592	...	1,039,403	—1,576,917	...
TOTALS	$330,866,085	$287,609,841	15.4	$298,831,846	$259,348,931	15.2	$325,140,155	$268,270,003	21.2	$ 5,725,930	$19,214,032	—70.2

** 1956 Figures reflect strike period of 74 Days, Resumed operation March 22, 1956.*

TERRITORIAL												
Caribar	$ 549,581	$ 490,405	12.1	$ 506,868	$ 433,490	16.9	$ 448,474	$ 356,254	25.9	$ 101,107	$ 134,151	—24.6
Hawaiian	1,275,851	1,084,977	17.5	950,235	841,842	12.9	1,280,175	1,190,419	7.5	—4,324	—105,442	...
Trans.-Pac.	440,403	391,906	12.4	383,608	351,297	9.2	523,610	493,699	6.1	—83,210	—101,793	...
INTERNATIONAL												
American	$ 1,720,285	$ 1,532,483	12.3	$ 1,443,236	$ 1,288,729	12.0	$ 1,493,329	$ 1,211,053	23.3	$ 226,956	$ 321,430	—29.4
Braniff	1,908,730	1,818,180	5.0	1,382,560	1,281,432	7.8	1,615,095	1,726,751	—6.5	293,635	91,429	221.2
Delta	1,549,109	1,262,931	22.7	1,426,697	1,164,357	22.5	1,240,357	1,198,520	3.5	308,750	64,411	379.3
Eastern	3,901,009	3,075,488	26.8	3,749,095	2,899,800	29.3	2,849,010	2,091,705	36.2	1,051,444	983,783	6.9
National	1,201,151	1,361,225	—11.8	1,120,853	1,263,523	—11.3	861,607	863,594	—0.2	339,544	497,631	—31.8
Northwest	5,932,509	5,456,366	8.7	3,544,544	2,966,157	19.5	5,860,168	5,557,494	5.4	72,341	—101,128	...
Panagra	5,106,081	4,896,628	4.3	3,864,311	3,643,270	6.1	4,703,596	4,408,222	6.6	402,485	488,406	—17.6
Pan American												
Lat. American	22,263,577	21,184,405	5.1	17,119,619	15,292,395	12.0	22,906,773	20,545,685	11.5	—643,196	638,720	...
Atlantic	25,004,022	21,894,741	14.2	18,583,025	15,262,979	21.8	26,440,324	23,805,566	11.1	—1,436,302	—1,910,825	...
Pacific	18,609,208	15,233,807	22.2	12,947,489	11,128,340	16.3	17,854,119	14,178,106	25.9	755,089	1,055,701	—28.5
Alaska	910,663	1,427,696	—36.2	736,225	673,189	9.4	1,725,177	1,788,412	—3.5	—814,514	—360,716	...
TWA	10,569,088	11,142,931	—5.2	7,527,641	7,963,578	—5.5	13,810,317	14,373,461	—3.9	—3,241,229	—3,230,530	...
United	2,723,125	2,738,267	—0.6	2,561,523	2,475,042	3.5	2,604,875	2,455,726	6.1	118,250	282,541	—58.2
TOTALS	$101,398,557	$ 93,025,148	9.0	$ 76,009,818	$ 67,302,791	12.9	$103,964,747	$ 94,204,295	10.4	$ 3,245,835	$ 1,179,147	...
LOCAL SERVICE												
Allegheny	$ 1,476,919	$ 1,226,740	20.4	$ 951,359	$ 748,804	27.1	1,919,859	1,439,895	33.3	$ —442,940	$ —233,155	...
Bonanza	784,016	676,532	15.9	461,718	389,521	18.5	785,152	721,991	8.7	—1,136	—45,459	...
Central	867,350	781,447	11.0	277,262	229,594	20.8	974,785	788,520	23.6	—107,435	—7,073	...
Frontier	1,537,939	1,500,522	2.5	759,279	816,652	—7.1	1,570,452	1,421,656	10.5	—32,513	78,866	...
Lake Central	719,835	636,384	13.1	319,876	263,527	21.4	786,796	668,164	17.8	—66,961	—31,780	...
Mohawk	NA	1,051,302	...	NA	836,898	...	NA	1,235,629	...	NA	—184,327	...
North Central	2,054,479	1,729,784	18.8	1,537,323	1,214,433	26.5	2,244,058	1,715,326	30.8	—189,579	14,458	...
Ozark	1,613,429	1,176,291	37.2	758,270	616,375	23.0	1,627,448	1,289,150	26.2	—14,019	—112,859	...
Piedmont	1,729,989	1,532,855	12.8	1,003,118	969,277	3.5	1,935,344	1,750,492	10.6	—205,355	—217,637	...
Southern	1,005,799	898,665	11.9	504,833	430,321	17.3	1,081,318	928,138	16.5	—75,519	—29,473	...
Southwest	1,221,865	980,085	24.7	815,148	649,925	25.4	1,406,392	1,121,504	25.4	—184,527	—141,419	...
Trans-Texas	1,579,974	1,302,551	21.3	768,632	627,297	22.5	1,629,127	1,330,226	22.5	—49,153	—27,675	...
West Coast	995,295	855,047	16.4	513,412	456,716	12.4	1,036,840	988,283	4.9	—41,545	—133,236	...
TOTALS	$ 15,586,889	$ 14,348,205	8.6	$ 8,670,230	$ 8,249,340	5.1	$ 16,997,571	$ 15,398,974	10.4	$ 1,410,682	$ 1,070,769	...
HELICOPTER SERVICE												
CHI Helicopter	$ 240,338	$ 119,246	101.5	$ 19,503	.....	...	$ 268,502	$ 118,926	125.8	$ —28,164	$ 320	...
Los Angeles	321,559	264,635	21.5	37,875	20,028	89.1	296,566	260,307	14.0	24,960	4,328	...
N. Y. Airways	438,098	429,498	2.2	91,773	50,459	81.9	606,811	405,876	49.5	—167,713	23,622	...

HONORS

Dr. W. R. G. Baker, vp-electronics division, General Electronic Co., has been re-elected president of the Radio Electronics Television manufacturers Assn. (RETMA).

Raymond H. Hering has succeeded William F. McGrath as exec. vp for the American Society of Travel Agents, Inc.

Mary O'Connor, United Air Lines' senior stewardess and the world's "flying-est woman" (with more than 6,000,000 miles), has just received the Amelia Earhart Award from the American Women's Assn.

H. F. Konig, gen. mgr. of the Light Military Electronic Equipment Dept. of General Electric Co., was named "Industrial Man of the Year" by the Industrial Management Club of Utica.

Richard H. Summerl, electrical design engineer at Douglas Aircraft Co., was elected president of the Aircraft Electrical Society.

Dr. John T. Rettaliata, pres. of Illinois Institute of Technology, Chicago, has been named chairman of the board of visitors for the Air University at Maxwell Air Force Base, Ala.

Dr. Jerome C. Hunsaker, member and former chairman of the National Advisory Committee for Aeronautics, received the Distinguished Service Medal, the Committee's highest award for "service of fundamental significance to aeronautical science, climaxed by an outstanding and unparalleled record of leadership . . ."

Mrs. Rebecca Hall Sparling, design specialist for Convair Division of General Dynamics Corp., received the 1957 Award for the Society of Women Engineers for significant contribution to engineering. Mrs. Sparling is particularly known for her work in high temperature metallurgy, gas turbine development and nondestructive testing.

William C. Foster, Olin Mathieson exec. vp in charge of high energy fuels activities, received an honorary doctor of laws degree from Syracuse University.

The "President's Award," the highest honor that United Air Lines can pay an employe, was presented to **Capt. R. L. (Rube) Wagner** of Atherton, Calif., for his "outstanding contributions and pioneering efforts in the field of commercial aviation."

Air transport changes

Edward J. Hanly named Supervisor of Cost Control for National Airlines, Inc.

Arthur W. Stewart, chief of adm. services for American Airlines at Love Field, Dallas, named project mgr. for American's facilities.

Thomas Nugent appointed district sales mgr. for Pan American World Airways for Iran; **Frank DePaola** appointed station traffic mgr. at Paris; **Frank S. Guzzardo** appointed asst. dist. traffic sales mgr. at Rome.

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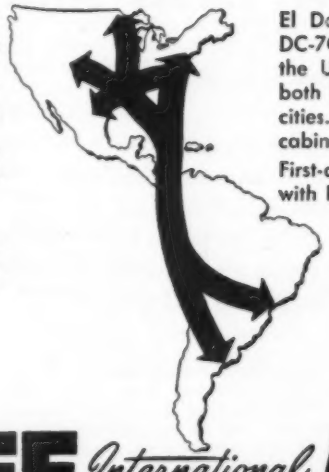

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FLY THE FINEST

FLY TWA

TRANS WORLD AIRLINES

A lesson in good will: keep passengers informed

by Eric Bramley

Keeping your passengers informed of unusual developments is a good idea, and it pays off. For example, United Air Lines found it necessary to substitute a DC-6B for a DC-7 on a New York-San Francisco flight, and the pilot so informed the passengers. Aboard was an editor of Sales Management magazine, who took note of the incident in a June 21 editorial. "Most of the passengers," he said, "would not have been aware of the switch in planes . . . But United wants its passengers to know the difference in planes—wants them to know that the line has a deserved reputation for respecting a customer's preference . . . For contrast, let's look at the railroads . . . Question: Can you recall a single time when the railroads showed they knew you cared whether you rode on one piece of equipment or another—or bothered to explain a substitution? Some people know when they're sitting on a tack—and do something about it. American consumers delight in strewing tacks around for the unwary and complacent."

* * *

A two-pound package valued at $1,150,000 was flown recently from New York to Amsterdam by KLM Royal Dutch Airlines. It contained two gems: the 44.5-carat Hope diamond ($1 million) and a 33.7-carat sapphire ($150,000). It wasn't many years ago that a shipper would have been considered touched in the head to entrust such valuable cargo to an airline to fly across all that water.

Bonanza adopts big 'B' insignia

NEW MARKINGS on Bonanza Air Lines' DC-3s feature the big "B" on tail. Colors are orange and black. Same markings are planned for company's F-27 turboprops now on order.

Domestic airlines must make certain that their houses are in order before the no-show penalty plan becomes effective Sept. 15. They'll have the customer pinned down so he can be fined when he's guilty. But in turn, the customer isn't going to put up with sloppy handling of reservations, clerical errors, etc., that result in his being called a no-show when he isn't. We commend Rex Brack, v.p.-traffic and sales of Braniff, and his staff for the job they're doing in this regard. A memo circulated to all Braniff reservations employes points out that "we and the customer will both be playing for keeps. We must assume our responsibility to the customer and deliver exactly what he ordered. We can't expect him to be patient with our shortcomings after he has faithfully fulfilled all his responsibilities to us." Braniff has been re-training personnel and has put out a series of colorful, humorous cartoons stressing the need for accuracy, double-checking, etc. It's a thorough program. If you're not familiar with it, Brack will furnish details.

* * *

United Air Lines has a very unusual new member of its Million Mile Club. Gordon Olson has piled up all his mileage during the past several years on the 340-mile San Francisco-Los Angeles route. He's a courier for the Bank of America, and Monday through Thursday nights he boards a plane at San Francisco with eight to 10 sacks of canceled checks destined for the bank's Southern California branches. At Los Angeles he stops just long enough to pick up northbound sacks, then makes the return trip. His "day" starts at 8:15 p.m., ends at 4:15 a.m. When bank officials gave Olson his five-year service pin, they attached a pair of wings.

Sales, Traffic, Promotion

American Airlines has completed a $250,000 renovation of its passenger facilities at LaGuardia Airport. Space in ticket and gate areas has been doubled, more seats added, self-claim baggage system installed . . .

Two airlines are using successful gimmicks to keep their names before travel agents, good accounts and other friends. **Pacific Northern Airlines** has for a long time sent out boxes of its book matches each month. New York office of **Varig**, Brazilian carrier, mails a useful "novelty of the month" . . .

TWA has made arrangements with Southern Pacific Railroad to handle its ticketing and reservations in 237 communities in seven states. SP has similar deals with **United** and **American** . . . Fourteen Suburban Trust Co. offices in Maryland suburbs of Washington, D.C., are now issuing **Eastern Air Lines** tickets . . .

Direct-mail news: Top-flight **TWA** series has been stressing "luxury" and "elegance" of company's new Jetstream Constellations . . . **Capital Airlines** mailing promotes airfreight service . . . **Pan American World Airways'** folder stresses advantages and economies of fall and winter family plan trips to Europe . . .

Lufthansa German Airlines is now giving each lady passenger a flight make-up kit containing perfumed soap, soap dish, tooth paste and brush, nail brush, beauty cream and perfume . . . Lufthansa says that in the last three months its passengers have consumed 4,488 bottles of wine and 5,037 bottles of champagne . . .

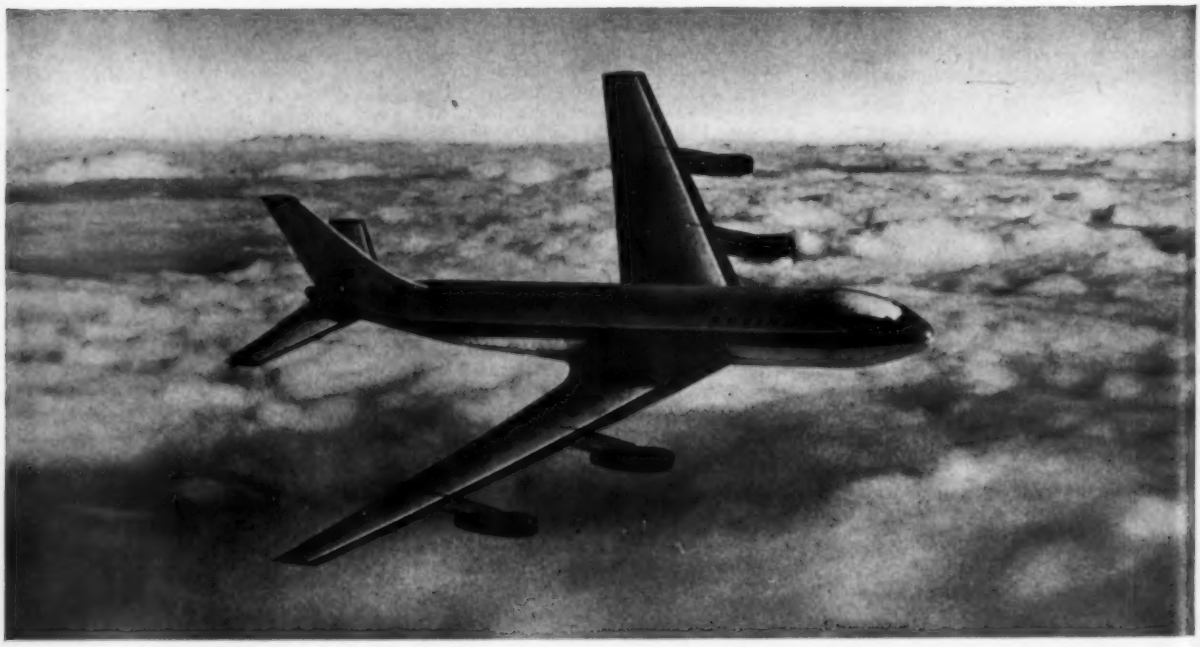
British Overseas Airways Corp. has opened a new ticket office at 530 Fifth Ave., New York . . . New **KLM** booklet lists eight "Royal Tours of Europe" with itineraries of from 10 to 43 days . . .

North Central Airlines has been engaged in "Operation Sparkle," a company-wide campaign for clean airplanes, ticket counters, stations and offices . . . **Hertz Corp.** has started car rental operations in Europe through its recent acquisition of controlling interest in Europcars S.A., Paris. Operations are conducted under the name Hertz-Europcars . . .

Pan American-Grace Airways has started first regularly scheduled one-plane all-cargo service between U.S. and west coast of South America. It's operating one DC-4 round-trip flight weekly between Miami and Lima, with a scheduled stop at Panama and flag stops at Cali, Quito, Guayaquil and Talara . . . Riddle Airlines has suspended service to Norfolk, Va., due to lack of sufficient volume of long-haul traffic.

Three B-52s at altitude. More than 1400 B-52s and B-47s have been built by Boeing.

Boeing has built more long-range, multi-engine jet aircraft than any other company in the world.



The 707 jetliner—test-flown over 2½ years—will bring you all of the advantages of this Boeing experience with jet aircraft.

BOEING 707

These airlines have already ordered 707s: AIR FRANCE • AIR INDIA • AMERICAN • B.O.A.C. BRANIFF • CONTINENTAL • LUFTHANSA • PAN AMERICAN • QANTAS • SABENA • TWA

TRANSPORT TRENDS

Domestic airlines' passenger traffic showed substantial gains in June and boosted totals for first six months. Three of the biggest trunks showed passenger-mile increases of from 9% to 10.7% for the first half. However, rising expense trend continues to be industry's major problem.

Air freight traffic boomed in the first half of 1957. When final figures are in, gain will be close to 35%. Since Railway Express Agency strike started in seven big cities April 22, carriers have been swamped with air freight business. Even before the walkout, which is still in effect, freight traffic had been more than 20% ahead of last year. Incidentally, observers expect the strike to give air freight a permanent shot in the arm. Many former users of rail express probably will continue to ship via air.

Airlines may get a CAB ruling early next month on their bid for a 6% passenger fare increase. CAB has scheduled oral argument for July 31 in the expedited case. Hearings ended July 10 and airlines have until July 24 to file briefs. Under Board's press release decision procedure, a ruling could be announced within days of the oral argument.

Two CAB compliance investigators have conducted a quiet but thorough investigation of the apparent leak of confidential material in the New York-Mexico City case. Many top airline officials were quizzed. The investigators' report will determine whether CAB turns the matter over to the Justice Dept. for further inquiry.

One of the biggest worries for airline managements today is that the bottom will drop out of the market for used piston-engine airplanes during the transition to turboprops and jets. Most lines' jet financing programs bank heavily on reasonable sales prices for retired aircraft. If market break is severe enough, carriers will be faced with formidable task of raising more money through debt and equity financing. Some companies are now considering immediate sale of their piston-engine fleets. They'd lease the planes back until jets and turboprops arrive.

Local service lines' need for aid in acquiring new planes is emphasized by recent statement that out of 35 Fairchild F-27 turboprops under firm order, only nine—and possibly fewer—have been completely financed. Estimate was given by G. Robert Henry, executive vice president of Bonanza Air Lines, in testimony before Senate Aviation Subcommittee on need for government-guaranteed loans. Fairchild took the orders largely on "good faith" although local lines invested some cash which would be forfeited if transactions should collapse, he said. Senate hearings on loan legislation have been completed, but House hasn't started yet. Chances of passage are considered good unless civil rights controversy ties up the Senate indefinitely.

Enthusiasm is waning among IATA airlines for the "thrift" fare that is supposed to be introduced on the North Atlantic next April. Planning for the thrift-class program is scheduled to be put in final shape at this fall's IATA traffic conference meeting in Miami Beach. But there's still no agreement among airlines as to how austere the accommodations should be. And there is increased feeling that the thrift fares originally proposed ($417.60 New York-London roundtrip, good for one year) won't result in any profit because of cost increases since the program was drafted in Cannes in early 1956.

Senate restores $380 million cut in Defense budget for aircraft procurement; bill goes to conference

The Senate passed the 1958 Defense Department appropriation bill, calling for restoration of $380 million of $474 million slashed by the House from new aircraft procurement funds.

The $34,534,299,000 DOD bill moved to a conference committee, where House economizers were expected to fight for compromise cuts. Another development, in the form of the controversial Civil Rights measure, however, may force postponement of final action.

The bill, which carried several amendments involving procurement activities, passed 74-0. It provides $6,126,000,000 for Air Force aircraft and related equipment, or $280 million over the House allotment; for the Navy $1,912,000,000, a $100 million increase.

Combined AF-Navy procurement funds, however, still fell short by some $900 million for new obligational authority for fiscal 1957.

The Senate, reversing the House down the line, restored a full $30 million to the services' research and development accounts. This would give the Army $400 million, the Navy $505 million and the Air Force $661 million.

Tacked onto the bill was an amendment calling for an end to "overlapping, duplication and waste" within the Defense Department. The watered-down version of the O'Mahoney proposal would authorize the Defense Secretary to transfer funds or merge and coordinate personnel to effect reforms.

Other amendments would:

Direct the Defense Secretary to utilize commercial transportation wherever possible. A committee report recommended that MATS farm out 40% of its passenger and 20% of its cargo business to commercial carriers.

Require DOD to award contracts "so far as is practicable" on a competitive basis to the lowest responsible bidder.

Other significant Senate restorations would hike Air Force operations and maintenance funds to $4,193,993,000, Navy ordnance procurement (which covers missiles) to $211 million.

On the latter the committee reported: "This restoration will provide for implementation of the planned procurement in 1958 in the areas of guided missiles, antisubmarine torpedoes and launching equipment, fire control equipment and essential propellants."

It said restoration of Air Force procurement money "will provide the minimum funds necessary to restore requirements in the aircraft spares area, prevent the stretching out of the missile development test program, prevent delay in the introduction of missile systems into inventory, and insure the meeting of minimum requirements for modernization of aircraft inventory."

UAL asks CAB to ban own staff from fare case

United Air Lines has asked the Civil Aeronautics Board to ban its staff from deliberations which the Board will shortly conduct in the Suspended Passenger Fare Case. The novel request was the latest development in the controversial case in which hearings were slated to end about July 15.

United based its request on the fact that the CAB staff has opposed the airlines' 6% fare increase and advanced new far-reaching policies in the process. Thus, claimed UAL, it would be unfair and prejudicial to the carriers if the same staff is permitted to analyze and brief the case for the Board Members.

Because CAB is under a statutory 180-day time limit (which expires September 27) in deciding the case, the Board has ruled out the customary initial decision of the hearing examiner. United, in its plea, asked CAB to utilize the examiner instead of its staff in its deliberations.

Grumman to build 370-mph pressurized turboprop with 2,200-mile range for executive market

Grumman Aircraft Engineering Corp. is entering the executive transport market with a pressurized turboprop capable of carrying a dozen passengers 370 mph at 25,000 ft.

The aircraft, designated Design 159, will be powered by a pair of Rolls-Royce Dart engines which develop 2,150 eshp each.

The new Grumman will be able to operate from runways less than 4,000 ft. long with full load. Maximum range is 2,200 miles, plus 45 minutes "hold" capabilities and reserve for an additional 230 miles in emergencies.

Gross weight of the new turboprop will be 31,000 lbs., span 78 ft. and length 64 ft. A feature of the plane is the location of the doorway and a self-contained stairway just aft of the cockpit.

This permits the 159 to be completely free of ground-handling equipment and allows the pilot complete control over all loading operations.

Henry Schiebel, Grumman's commercial aircraft sales manager, said that executive fleet operators have shown much interest in the Grumman design.

"A great need exists for an airplane for the corporate and executive field which offers realistic speeds and range," Schiebel declared.

Design 159, he said, meets and surpasses requirements for this type of aircraft. He added that the plane was designed strictly for the executive market and Grumman has no plans to interest the military.

Design 159 is available in various interior arrangements including a high-density version for 20 passengers.

Grumman hopes to have two prototypes ready to fly by next May. The transport will be certified under category 4b government airliner regulations.

AIA president says industry, rather than government or universities, should develop new missile systems

Industry, not government arsenals or tax-free universities, should have the responsibility for development of new guided missile systems, according to Orval R. Cook, president of the Aircraft Industries Assn.

The AIA head, at a recent news conference, said the government arsenal "has outlived its usefulness" as a weapons developing and producing organization, although it still provides valuable contributions in the form of new concepts and basic research.

The practice of giving universities and other tax-free institutions contracts for actual development of missile hardware was termed "unsound" by Cook. He declared that even though the work is usually done on a non-profit basis, the savings are more than offset by the extra cost of transferring the job from the development agency to the producing organization.

"The aircraft industry has assembled strong teams of scientists, engineers and technicians whose talents are being applied to missiles as well as to manned aircraft," Cook said. "We see no reason why their functions should be duplicated in either government establishments or universities."

Cook found no fault with the quality of development work conducted by universities and other non-profit organizations, but he said that the industry can produce missiles more efficiently and at lower cost than can government arsenals.

Cook expressed no preference for the aircraft industry over the electronics industry in the development of missiles, but he did say that missile development and production is of vital importance to the aircraft concerns because of the impending reduction in manned aircraft business.

"With a decline in production of manned aircraft in the next few years, it is imperative that this industry replace this business with pilotless aircraft. Otherwise America would lose a keystone of its national defense structure and a strong, stable aircraft industry," he said.

X-17 reaches highest speed for instrumented missile

The Lockheed X-17 has reached the "highest speed ever achieved by any instrumented missile" according to Defense Dept. Earlier this year, the test missile had reached a speed of 9,000 mph.

Lockheed, in a statement following the Pentagon release, said the X-17 has flown successfully in 92% of all launches and has performed perfect missions in more than 70% of all launches.

The X-17 consists of a Sergeant rocket as first stage, three Recruits as second stage and a single Recruit as the third stage. Thiokol Chemical Corp. supplies the motors.

CAB upholds airline baggage practices

Civil Aeronautics Board Examiner Leslie G. Donahue recently upheld industry-free baggage allowances and excess baggage charges. Both were found to be just and reasonable. CAB had instituted the investigation April 11, 1956.

Donahue upheld the standard industry practice of allowing 40 lbs. free on domestic flights and 44 lbs. coach and 66 lbs. first-class for domestic portions of international flights.

T. J. Harris leaves AA

Thomas J. Harris, 19-year veteran with American Airlines, has resigned as the company's director of airfreight sales to become director of marketing for Aero Design and Engineering Co., Oklahoma City.

North Central Airlines wins nonstop rights

Civil Aeronautics Board has voted to grant North Central Airlines nonstop rights between Chicago and Duluth, Minn. and to deny a Northwest Airlines proposal under which Northwest and North Central would operate an interchange service via Minneapolis-St. Paul.

Board's action was announced by press release with a formal opinion and order to be issued at a later date.

In addition to its nonstop route, NOR was authorized to serve Chicago and Duluth on a one-stop basis via Madison, Wis., and on a two-stop basis via Milwaukee and Green Bay, Wis. Simultaneously, Northwest's authority to serve Duluth on its trunk route was eliminated.

North Central also was authorized to operate between Duluth-Superior and Sault Ste. Marie via Ironwood, Hancock-Houghton and Marquette.

Nonskeds win verdict in railroad rate case

U.S. District Court in Washington, D. C. has upheld the non-scheduled airline industry in its long fight against "concerted rate practices" of the nation's railroads.

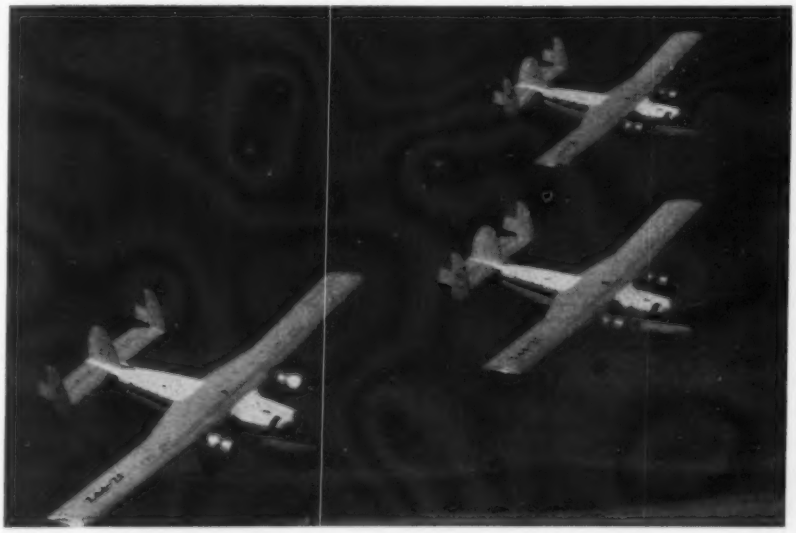
Aircoach Transport Association (now merged into Independent Airlines Association) brought the suit in court earlier this year, charging the railroads with antitrust violations and seeking $45 million damages.

Judge Joseph C. McGarraghy, in upholding ACTA and four individual lines that joined in the suit, said the railroads were not immunized from antitrust violations in connection with the rate issue. ACTA contended the railroads bid from 10% to 50% below regular fares when competing with air carriers for military charter business, but bid maximum fares when no competition was involved.

ACTA contended some 17 of its non-scheduled airline members were driven out of business by the rate practices of the rails. Judge McGarraghy held the rate practices complained of are illegal *per se*, and enjoined the railroads from continuing them. He did not rule on the amount of damages, however, and that will be resolved in a subsequent court trial.

Twin Pioneers off to New Guinea

THREE SCOTTISH AVIATION Twin Pioneers pass over the Scottish coast near Prestwick before being flown to New Guinea, where they will be operated by Kroonduif, a subsidiary of KLM Royal Dutch Airlines.



Opening of British Mach 2.8 windtunnel attracts 400 industry executives; research results evident

by James Hay Stevens

BEDFORD, ENGLAND—Official opening of the 8 x 8-ft., Mach 2.8 windtunnel at the Royal Aircraft Establishment's Bedford site by Supply Minister Aubrey Jones was attended by some 400 aviation industry executives.

Most interesting exhibits, were those of the work in the subsonic 13 x 9-ft. windtunnel, where investigation into the behavior of ultra-low aspect ratios at large angles of attack is being carried out.

This work is basic research and has covered models of "square," "diamond" and "wedge" form. These latter, being exaggerated deltas of about 20° to 40° included angle, have obvious supersonic applications.

Arising out of the observation of an asymmetric vortex formed behind yawed missile bodies at high angles of attack, investigation of the forces causing unstable flight was made. This first took the form of offering a flat "plank" end-on to the flow. By smoke, oil/titanium oxide and pressure plots the characteristics of the vortex flow were established.

This proved high suction and lift forces for very reasonable drag values. Follow-up research on usable symmetrical shapes, with "yawed" leading edges to generate the vortex-lift, pointed to the importance of a sharp lip to initiate the separated flow. The wedge-delta wing gives increasing lift as the vortices grow in size with larger angles of attack until the flows meet down the wing centerline. The lift curve slope then falls off, *but* there is no abrupt stall.

The form of this "separation lift" is such that wing dropping may well be eliminated. Information was not available, however, about pitching moment change and fore-and-aft stability.

Also in the subsonic flight display was a working model of jetlift ground effect. This shows that with a lifting jet, or jets, ejecting under a wing, downward suction in excess of the jet thrust can be created as a result of the formation of strong vortices. This is a function of wing area and gear height.

Furthermore, not only must the wing be well clear of the ground, at least double the height of a conventional gear, to obtain lift at all, but the marginal region is unstable so that the airplane jumps off and sits down hard.

In the spinning tunnel display was shown a free-flight model of the Saunders-Roe SR-53 dual-power supersonic research plane. Apart from a single photograph, this rocket/turbojet delta, testbed for the deHavilland Spectre HTP rocket, is currently classified. The dynamically similar model (illustrated) was used for spin drop tests from a balloon at 4,000 ft.

Airplanes on display included a Hawker Hunter with area rule fuselage; a Short SB-5 showing the effect of the leading-edge notch vortex generators in place of wing fences; a Fairey Delta 2 with sensitive skin-heating thermomenters on its nose; and the Rolls-Royce "Flying Bedstead" jet lifter—which did not fly because of a high wind. Flight demonstrations were made by the FD-2 and the English Electric P-1.

Olin Mathieson producing new high-energy fuels

High-energy chemical fuels that are said to increase the range of air-breathing engines by 40%, or allow a trade-off for greater payload or speed, are being produced on a "semi-commercial" basis, according to the Olin Mathieson Chemical Corp. The company says it started shipping these fuels to the Air Force last month.

Olin Mathieson executive vp W. C. Foster estimates that high-energy fuels now being produced, called HEF-2 and HEF-3, are harbingers of what will become a billion-dollar industry within the next decade.

An interim Olin Mathieson facility, scheduled for end-of-the-year completion, is expected to produce three times the amount of high-energy fuels now being made. Such fuels include pentaborane (boron-based), which is claimed will increase jet-powered aircraft range by 50%.

A $36-million Air Force-sponsored plant, with a 1959 completion date, is being constructed by the chemical company at Model City, N. Y. It is believed this facility will employ 800 people at the beginning of operations, 1,600 in 10 years, and many thousands in 20 years.

An Olin Mathieson official said that HEF-2 and -3 satisfy the criteria for a satisfactory chemical fuel: (1) high-energy content per unit weight; (2) high-energy content per unit volume; (3) easy and safe handling; and (4) low cost in mass production.

High-energy fuels are those having heating values higher than those of petroleum-based fuels. Heating value of JP-4 and -5 is 18,000 BTU/lb.

Marconi ready to market Doppler system

Further light on the status of Doppler navigation equipment shows that the British firm of Marconi's Wireless Telegraph Co., is in the best position to market the first such equipment for airline use.

Marconi's position in the Doppler equipment field was revealed at the recent meeting of Aeronautical Radio Inc.'s Airlines Electronics Engineering Committee in Miami, Fla.

Available now is military equipment or a repackaged version of military equipment, such as General Precision Laboratory's RADAN PC-102 is reported to be.

Such equipment would probably not be acceptable to airline users because of certain ARINC component, packaging and wiring standards usually required by the carriers. One example of this is use of subminiature tubes in the GPL equipment. These tubes are not acceptable to the airlines.

Marconi has designed its equipment to ARINC standards as far as possible. Some of the Doppler characteristics must yet be set by ARINC.

Ryan Aeronautical is reported to be pushing early development of a commercial version of its system. However, it is likely that further decisions on operational and installation compatibility problems must be made before U.S. manufacturers go ahead on civil units.

Some of these are continuous-wave versus pulsed signals, antenna stabilization versus data stabilization by electronic means, computer signal requirements and others.

Ryan uses continuous wave with data stabilization and GPL uses a pulse system with antenna stabilization. Marconi's system is continuous wave and stabilization is by electronics for pitch effects. No roll stabilization is used.

It was also disclosed that another British firm, Decca Navigator Ltd., has military Doppler equipment that has not yet been declassified.

Canadian Marconi equipment features were also revealed. It terms of numbers of tubes, circuit complexity and other construction features, the Canadian system is said to be the simplest of all Doppler navigators yet discussed.

Consensus among U.S. and European International carriers on planning for Doppler use is to start with the sensor only for getting ground speed and drift angle. After that a simple computer for navigation information could be tried and this would gradually evolve into more complex forms with perhaps more than one application.

Strong criticism was leveled at delays in start of the radar beacon in-service environment originally scheduled for early this year. Now that operational discipline and system questions relative to military beacons have been settled by Departments of Defense and Commerce, the airlines are anxious to see the tests start.

Ground equipment procurement problems are reportedly holding up beginning of the tests.

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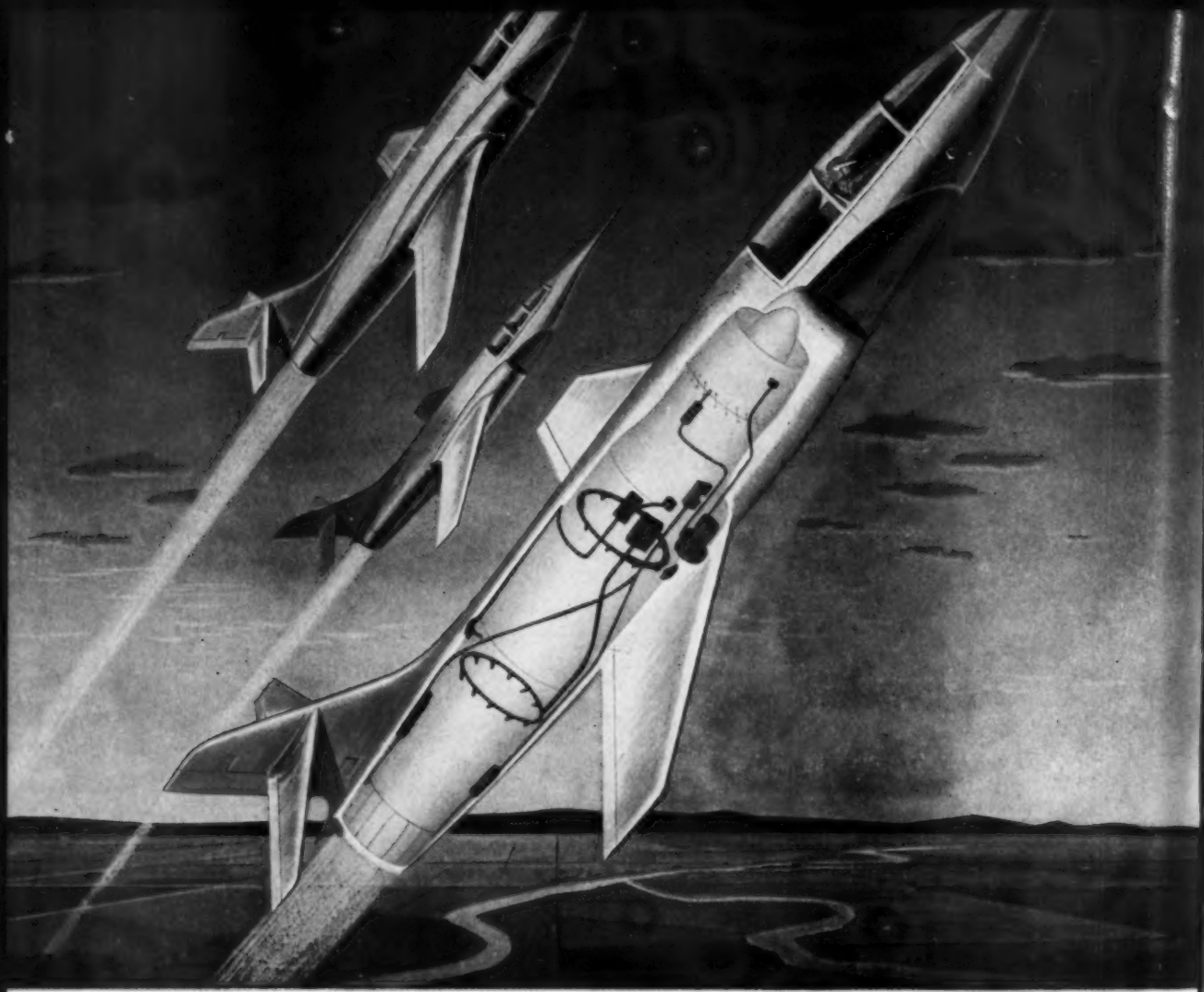


TOWARD MACH 3

WITH A COMPLETE BENDIX SYSTEM FOR FUEL METERING AND ENGINE CONTROL

When the pilot swings the lever from idle to emergency thrust—or back again—things must happen fast in the big jets.

But not too fast!

For, pouring it on, or cutting back faster than the engine can take it, spells disaster. The penalties are ruinous over-temperatures, compressor stall or flame-out.

When the pilot orders a change in thrust, the Bendix* fuel metering and engine control system takes over. Fuel feed is automatically computed and scheduled. Geometric controls such as exhaust nozzle area and inlet vane angles are set. Automatically and instantly, engine response is crowded to the limit—but not beyond!

Matched sets of Bendix components—pressure and temperature sensors, electronic amplifiers, fuel metering units and engine control actuators—work together as a *system*, spanning the length and girth of the engine.

Bendix components, designed and engineered together, invariably give more efficient performance than any arbitrarily assembled system.

So, when it comes to fuel metering and engine controls, think of a complete and integrated system. Then we suggest you think of Bendix and the Bendix Products Division.

*TRADE MARK

Bendix PRODUCTS DIVISION South Bend, IND.

Bendix AVIATION CORPORATION

TRANSPORT CHANGES

Robert A. Procuniar appointed supt. of sales promotion for midwestern div. of United Air Lines.

Stanislav Krejcik, European technical liaison officer of International Air Transport Assn., has been transferred to IATA's head office in Montreal.

Walter Girling named manager agency stations for British West Indian Airways; **J. Oliver Johnson** was named traffic mgr.; **Richard Vendryes,** asst. to gen. sales mgr.; **L. Rodriguez-Seijas,** reservations supt.

Jan N. F. de Vries appointed mgr. of the Southern Region for KLM Royal Dutch Airlines; **August Dijkstra,** for the Western Region and **John A. Bussian** was appointed Chicago district sales mgr.

Stephen L. Meyers promoted to district mgr. for KLM in Pittsburgh.

Jack Sannar named to head Flying Tiger Line's new midwest sales offices in Detroit.

Arnold H. Brown named Atlanta district sales mgr. for Riddle Airlines.

John G. Andriessen and **Douglas V. Bryde** appointed to cargo sales staff of the British Overseas Airways Corp.

Delta Air Lines has announced the following appointments: **Edward J. Preston,** supt. of cargo sales-eastern division, Atlanta; **Robert B. Parsons,** mgr. of schedules and planning, Atlanta.

Denzil Merrill, former pilot with Western Airlines, joined Air Transport Assn. as airport and visual aids specialist.

Donald G. Thompson appointed resident sales representative for BOAC in Connecticut.

Glenn C. Cowart promoted to sales mgr. for Delta Air Lines at Ft. Worth, Tex.

Robert Smalley has resigned as vp Couture Rent A Car, Miami Beach, and has been named to executive staff of Hertz Corp., Chicago. **Robert W. Deatrick** appointed exec. vp of Couture.

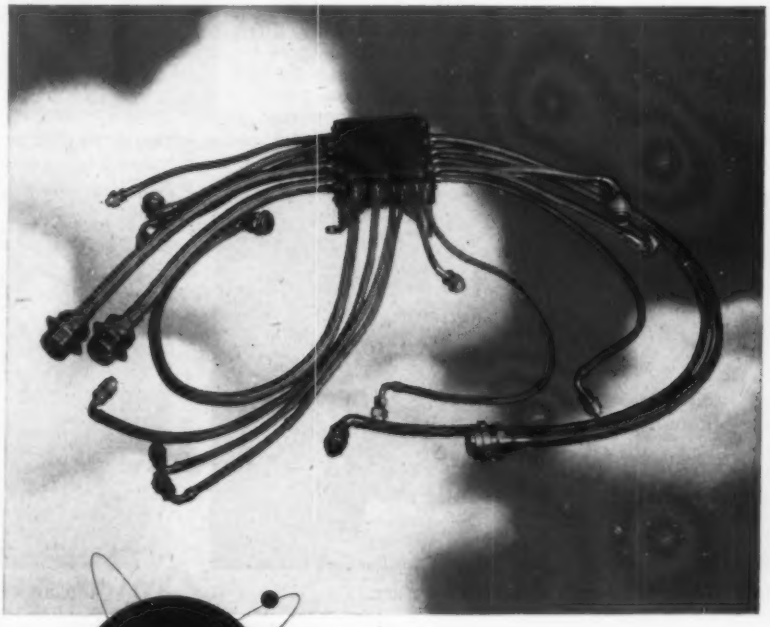
Miss Marguerite Lemarchand will be in charge of Air France's new office in Hartford, Conn.

Swissair has named the following resident sales reprensentatives: **Wallace Stump,** Detroit; **Werner Fitze,** Seattle; **William O'Neil,** Minneapolis; **Bruce Daigler,** Buffalo; **Urs Dur,** Boston.

Louis P. Messing succeeds **Tony Olanio** as catering supt. Pacific-Alaska Div. of Pan American World Airways. Olanio has been appointed exec. chef for the Interstate Co. at San Francisco International Airport.

KLM has reorganized its U.S. sales organization into five regions, **A. C. Koreman,** New York regional mgr., will be in charge of the northeast region. **James Caputo,** Miami district mgr., will be passenger sales mgr, for the New York district. **John Wold** continues as freight sales mgr. for the New York district. The Washington, D. C., office will retain its former organizational setup under **Lestrade Brown.** The midwestern region will be under **Charles L. Bulterman. Eric Versteegh,** formerly Los Angeles district mgr., will be in charge of the Denver office. **Jack Barbour,** commercial sales mgr. of the New York office becomes district mgr. in New Orleans, replacing **George L. Boggs,** resigned. **Stephen Meyers** becomes district mgr. in Pittsburgh.

bernco *wiring harness... precise, reliable, handiwork at reasonable cost!*



bernco

Controls
Wiring Harness
Test Equipment
Thermocouples

The facilities, engineering staff and skilled craftsmen, at BERNCO, form a specialized pool—expert at producing wiring harness for any application. BERNCO will save you time and money. All harness assemblies are produced to rigid quality standards, and each assembly is 100% inspected from start to finish.

BERNCO will engineer the entire harness assembly, or work to your drawings and specifications. All types of wiring harness and cable assemblies are produced, including: flexible metal conduit; teflon tubing; vinyl tubing; laced cable with breakouts as required; ignition cables and combinations or special designs. Exclusive "injection-sealing"* is available, when required.

For a *complete* service in the production of electrical, electronic or electro mechanical component parts, try BERNCO . . . where a reputation for producing *reliable* component parts at *reasonable* cost has won the confidence of the nation's leading manufacturers and government agencies.

*BERNCO'S exclusive injection-seal process prevents moisture accumulation, wire breakage and insulation failure under severe operating conditions.

A brochure on BERNCO Wiring Harness, Controls, Test Equipment or Thermocouples will be mailed upon request. Write for your copy, now.

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Circle No. 23 on Reader Service Card.

American Aviation's Air Show Album

MAY 22 was an historical date for American Aviation Publications and perhaps also for Paris. It marked the company's first reception in the French capital. Unlike the many other parties that took place in Paris at the time of the International Aircraft Show, the AAP reception was held in a novel setting—on a luxury river boat on the Seine, the G. Borde Fretigny which was used a few weeks earlier to transport the Queen of England down the Seine. On May 22 it carried a group of 250 distinguished aviation personalities on a similar trip. These top European aircraft manufacturers along with U.S. aviation personalities in Paris for the International Air Show renewed many an acquaintanceship with the predominantly French group aboard the vessel.

G. BORDE FRETIGNY ready for AAP cruise.

HOST Wayne W. Parrish signs ship's register.

AVIATION guests aboard the luxury river boat.

Paris air show personalities.

Lee Rogers
Lockheed-Marietta

James Patterson
United Aircraft

Ben Marble
Douglas Aircraft

Norman Clements
United Aircraft

Al Cline
Northrop

Don Stiess
Douglas Aircraft

N. Detierre
ICAO-Paris

Maurice Tillier
Aviation Writer

S. Wourghaft
IATA-Paris

Jim Nolan
Pubrel-Paris

Passenger fatality rate shows sharp decline since 1945

by Anthony Vandyk

A remarkable downward trend in passenger fatality rates since 1945 is pointed up by the International Civil Aviation Organization in its latest (No. 7) Aircraft Accident Digest. This extremely competent publication, priced at $2.50, contains a detailed analysis of accident statistics for the year 1955, an historical record of selected data for the years 1925 to 1956 inclusive, and summaries of aircraft accident reports from all parts of the world.

ICAO notes that the fatality rate per passenger-kilometre of 0.78 for 1956 was 25% of the 3.09 for 1945, although slightly higher than the rate of 0.66 in 1955. For the fifth consecutive year, the 1956 rate remained at less than one fatality per 100-million passenger kilometres flown.

Although the numbers of passengers killed on scheduled flights over the period 1952 to 1956 ranged from a low of 356 persons in 1953 to a high of 565 persons in 1956, the extent of the increase in passenger traffic has more than offset the change in the level of passengers killed, thereby maintaining the fatality rate below the mark of one.

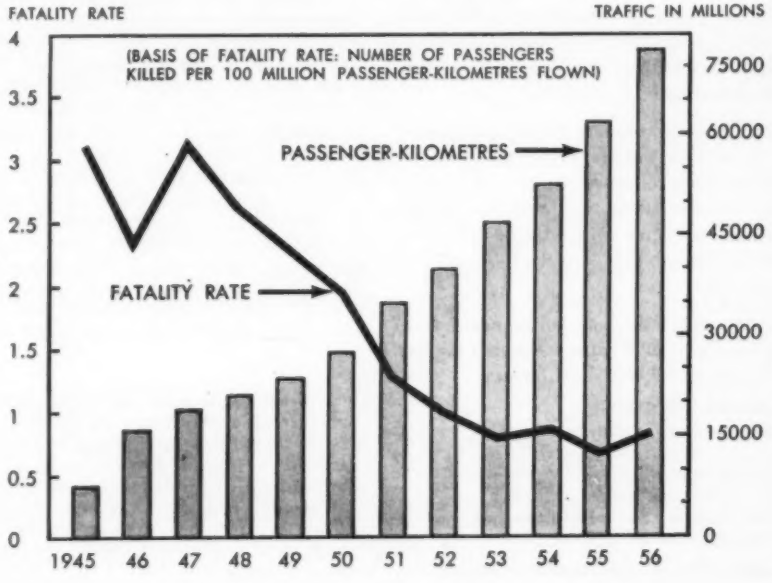
ICAO has devoted considerable effort to classifying the accident reports summarized in the digest. Of the 45 accidents, the largest percentage occurred in the en route phase (29%). A further 18% took place during climb after takeoff and of these 50% were due to pilot error. Another 18% occurred on the final approach. "Collision with terrain" accounted for 22% of all the accidents and a further 22% were due to "other collisions."

Classifying the accidents by causes ICAO found that 51% of all 1955 accidents reported were caused by pilot error—9% less than the 1954 percentage. Material failure accounted for 18%, with 50% of these due to engine trouble. The breakdown for the remaining 31% was as follows: errors of other personnel, 11%; weather, 9%, and miscellaneous, 11%.

Of the 23 accidents caused by pilot error five were due to misjudgment of distance; four to improper operation on authorized instrument flight; three to failure to compensate for wind conditions; two to misused powerplant or powerplant controls; two to the exceeding of operating limitation; two to failure to observe other aircraft; one to inadequate flight preparations; one to attempted flight beyond ability or experience; one to misuse of brakes and/or flight controls on the ground and one to continuance of VFR into unfavorable weather.

The five accidents ascribed to errors of other personnel were the result of inadequate maintenance. There were four accidents caused by weather—two by fog, one by low ceiling, one by thunderstorm. Material failure accounted for eight accidents. Four involved failure of engine; three, propeller failure and one, landing gear failure.

Of the five accidents due to miscellaneous causes, two were resulted from explosion of timed infernal machines; one resulted from an inflight fuel explosion; one resulted from an attack on the aircraft by jet fighters and in the fifth cause was undetermined.



BRIEFS

Two Japanese domestic carriers, **Japan Helicopter and Airplane Transport** and **Kyokuto Koku (Far East Airlines)**, will merge by the year's end. Former operates three Herons, two Doves and four DC-3s, while latter has two Doves, three Marathons and three DC-3s.

Sabena Belgian World Airlines has opened a passenger and car ferry between Ostend, Belgium, and Southend, England, in association with Air Charter Ltd., British Independent.

Saab-Aviation SO 4060 experimental supersonic bomber (two Atar Gs) is scheduled to fly around October 15, 1957.

East African Airways in September will inaugurate the first direct air service between Southern Africa and India. The India service will be linked to EAA's present weekly Argonaut service between Durban, Salisbury, Dar-es-Salaam and Nairobi will be routed via Aden and Karachi to Bombay . . . **CGTA-Air Algerie** has decided to buy two Noratlas.

Olympic Airways, the new Greek airline, is operating the following international routes: London-Paris (Le Bourget)-Rome-Athens-Istanbul (twice weekly with DC-6B); London-Paris (Le Bourget)-Rome-Athens-Beirut (twice weekly with DC-6B); Athens-Istanbul (once weekly with DC-4); Athens-Cairo (twice weekly with DC-6B); Athens-Rhodes-Nicosia-Beirut (once weekly with DC-4).

BOAC has inaugurated thrice-weekly Britannia service on the London-Tokyo route . . . **East German's Lufthansa** has started the following domestic services: Berlin-Barth (Rostock/Stralsund); Berlin-Dresden; Berlin-Erfurt; and Berlin-Leipzig . . . **Swissair,** which recently extended its South American service to Buenos Aires, has started to transport fresh Argentine meat to Switzerland. One ton of meat is to be taken on each trip in a special compartment stocked with dry ice. The carrier's DC-7Cs now fly from Geneva to Rio de Janeiro with only one intermediate stop—at Dakar . . . **Ethiopian Airlines'** provisional license to operate twice-weekly service between Addis Ababa and Nairobi has been withdrawn on instructions from the British government.

To owners and operators of Pratt & Whitney Aircraft powered aircraft:

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To be certain of receiving *genuine factory parts* for your Pratt & Whitney Aircraft engine, see a factory-authorized distributor when you need engine maintenance or overhaul.

These approved distributors, located conveniently in all parts of the country, keep comprehensive stocks of factory parts, and have the facilities, skilled personnel, and up-to-date P&WA instructions to give you the best possible service.

To insure the best performance from your Pratt & Whitney Aircraft engine, see these P&WA distributors:

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Branches at: Newark Airport, N. J.
814 N. Main St., College Park, Ga.
5245 Northwest 36th St., Miami, Fla.
5821 Seminary Rd., Baileys Crossroads, Alexandria, Va.

NORTHWESTERN AERONAUTICAL COMPANY
Holman Field, St. Paul, Minn.

PACIFIC AIRMOTIVE CORPORATION
Burbank, Calif.
Branches at: Boeing Field, Seattle, Wash.
Oakland International Airport, Calif.
Stapleton Airfield, Denver, Colo.

SOUTHWEST AIRMOTIVE COMPANY
Love Field, Dallas, Texas

Pratt & Whitney Aircraft
Division of United Aircraft Corporation
East Hartford, Connecticut

WEST COAST TALK

by Fred S. Hunter

Northrop figures T-38 is economical trainer; some choice tidbits, western flavor

NORTHROP AIRCRAFT cites its T-38 supersonic jet trainer as a good example of tailoring defense to the dollar capability of the nation. Over a five-year period, the company says, T-38 trainers can be purchased, maintained and operated in force strength at total savings over competitive types of nearly a billion dollars. Northrop's also counting on a combat version of the T-38 becoming the big fighter seller for NATO countries.

Things are getting tough all over. Western Air Lines had to quit giving free perfume to the ladies on its californian flights. The perfumer raised the price. But the champagne still flows.

Price of the turboprop DC-7T is $2,985,000, but if you can get along with a DC-7D cargo version you can save $2,000. It's only $2,983,000.

Pan American is changing its style in advertising and promotion. Refers to itself as Pan American, Pan Am or PAA, cutting out the "World Airways" part of the company name. The old "flying" type lettering is disappearing, too, being replaced by block-type letters.

North American Aviation picked Scott Crossfield to fly the X-15 because of his wide background as a test pilot for NACA, but his own kids are a little skeptical of his prowess along that line. Seems the neighbor kids tell Scott's youngsters the old man can't be so much as a test pilot because he never wrote a book.

Couple of editions back we hinted that it just could be North American's F-107 is the fastest airplane flying today. Oh, brother, did that stir up a storm? Now, if the Department of Defense will just set up a race between the F-107, Chance Vought's F8U, Lockheed's F-104 and Republic's F-105, we hereby make application for the pari-mutuel concession. Everybody wants to bet.

Tulsa division of Douglas has a team out seeking subcontracting work. North American's Los Angeles and Fresno divisions would like some, too.

The story was told on Gen. Curtis LeMay at a banquet given in his honor in Omaha prior to his departure from SAC to become vice chief of staff. Flight plan prepared for the B-52 flight around-the-world called for an elapsed time of 45 hours 16 minutes. Actual time was 45 hours 19 minutes. When Gen. Archie Olds, who led the flight, climbed out of his airplane, he was greeted by Gen. LeMay accusingly: "Archie, you're late!"

Air Force's naming of Convair's F-102 the "Dagger" and the F-106 the "Dart" is fancifully alliterative—pretty good names, too—but how about the Army having been first with the "Dart," which is the name of one of its missiles?

Fred Harvey is slated to take a shot at the airport restaurant business with a bid for the concession at the new terminal building in Los Angeles. Another prospect, Blum's, the "society" confectioner from San Francisco. But the most active candidate to replace Mike Lyman, who has the concession at the present terminal, is Interstate Co., big Chicago concern which operates the concession at the San Francisco International Airport. It's had its advance campaign under way for about a year now. The saloon trade makes the restaurant and bar concession at big airports highly attractive.

Under-shooting is the problem that's behind the feeling in some circles that airports may have to install arresting gear to serve as runway safety stops for jet transports. With piston airliners, a touch of the propeller controls provides immediately lift for a pilot who finds he may be coming in a little low. But jets are slow on pick-up. Pilots, guarding against under-shooting, may have a tendency to come in high. A little too high and you run out of runway. It would take a two-inch cable to stop a DC-8.

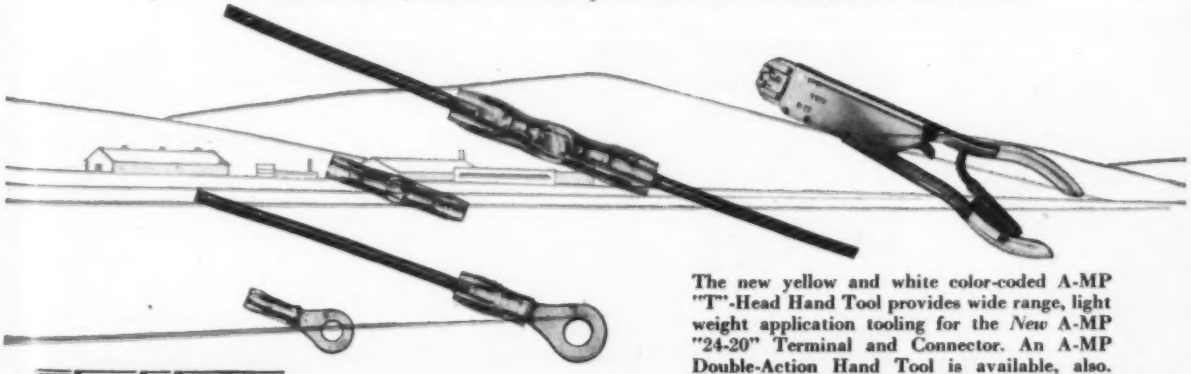
Gage Mace, Jr. is as sold on North American Aviation as Gage Mace, Sr. is on American Airlines, which is why Gage Mace, Jr. is an engineering test pilot for North American instead of a co-pilot for American Airlines, where Gage Mace, Sr. is western regional operations manager.

Half the fuss over sonic booms stems from politicians making political capital and newspapers making headlines.

The *New* A-MP "24-20" Terminal and Connectors are designed expressly to resist *vibration, shock and similar stresses* encountered in wire applications in every industry. They retain all of the excellent features of the A-MP Pre-Insulated Diamond Grip line, with special emphasis on the need for weight and space savings so important in today's equipment design.

Features of the *New* A-MP "24-20" Terminal and Connector are:

• Designed to accommodate smaller insulation diameters of new wire specifications. • Nylon insulated for the many favorable advantages provided by this reliable synthetic material. • Miniaturized for space and weight savings. • The unique design of the terminal's tongue area affords maximum utilization of the metal's inherent structural characteristics.



The new yellow and white color-coded A-MP "T"-Head Hand Tool provides wide range, light weight application tooling for the *New* A-MP "24-20" Terminal and Connector. An A-MP Double-Action Hand Tool is available, also. Both tools feature the A-MP Certi-Crimp® Control . . . for positive crimping of the terminal to the wire.

Additional information is available on request.

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SAC Silver Jubilee Newsreel

BY JACK PATTON

SPREADIN' THE GOSPEL
MAH FRANS
SAC "MISSIONARIES" SET OUT TO PIONEER PARTS AND ACCESSORY SALES TO THE AIRLINES
DELTA
AMERICAN
BRANIFF
RESULT: CURRENT MULTI-MILLION DOLLAR SALES TO 12 AIRLINES
YOU NAME IT.. WE'VE GOT IT!
AJAX FLYING CO.
SUPPLIES AND NEW IDEAS ALSO FLOW TO FIXED BASE OPS, LARGE AND SMALL
FISHING'S GOOD TOO!
DENVER
DISTRIBUTION DIVISIONS HAVE OPENED IN KANSAS CITY AND DENVER

AC, Aeroquip Corp., A. P. Parts Co., Bendix Products Div., B. F. Goodrich, Canadian P & W A, Delco-Remy, Eclipse-Pioneer, Glidden Co., Gould Nat'l Batteries

Southwest Airmotive not only has pioneered many vital equipment-sales concepts, it also has done much to open the industry's eyes to a proud meaning and a new dignity in the word "distributor." The firm's role in worthy industry affairs is legendary, dating 'way back to such things as this SAC-sponsored WW II aeronautical tent-show.

Grimes Mfg. Co., Hamilton Standard, Lycoming, Montrose Div. (Bendix), New York Air Brake, Pacific Div. (Bendix), Packard Electric, Pesco

Set to move in the fall into its new home—the former City of Dallas airline terminal (immediate right)—SAC's distribution division is one of aviation's finest sales forces. VP Paul Kennedy, "head coach" of a fiercely loyal team, is shown in the inset photo presenting a service award to Bob Jackson, Midwest Division manager.

Pioneer Central Div. (Bendix), Pratt & Whitney Aircraft, Red Bank Div. (Bendix), Scintilla, Skinner Div. (Bendix), Utica Div. (Bendix), and Willard Batteries

1932 —A QUARTER CENTURY OF LEADERSHIP— 1957

Southwest Airmotive Co.

LOVE FIELD DALLAS

DIVISIONS: KANSAS CITY, KANSAS / DENVER, COLORADO

Circle No. 25 on Reader Service Card.

SIDELIGHTS

Enforced instability?

How the financial community regards the air transport industry was reported recently by an airline official. He says the conversation went like this:

Analyst: I am afraid that most of us regard your industry as an unstable, hence a speculative or risky enterprise.

Airline man: Doesn't the fact that we are covered by a promotional law and given special regulation by the government of the United States give us an element of guaranteed stability?

Analyst: Sir, we regard the government as a factor for instability in your business.

Some weighty decisions

When his colleagues recently refused to permit a transatlantic charter flight for a Baltimore choral group known as Junger Maennerchor, Inc., CAB member G. Joseph Minetti supported the group with this legal conclusion: "German-born Baltimoreans and Baltimoreans who are expert in singing German folk songs don't constitute a significant portion of the general public." Not to be outdone, other members who nixed the flight said, "Junger Maennerchor has two types of members, active and passive."

A strange underplay

Aviation people can't figure why the *New York Times*, usually considered the finest newspaper in the U.S. and one of the tops in the world, consistently underplays aviation news—especially major air transport developments. It's no fault of the Times' able aviation editor, Dick Witkin; it's some sort of top policy or failure to evaluate importance of a great new industry.

Airline stories are usually buried underneath waterfront, shipping and other miscellaneous stuff in the rear of the paper. Yet if all airline advertising suddenly disappeared from the paper, the loss would be felt sharply. Generally speaking, the Times' coverage of military aviation isn't too bad.

Height of tactfulness

Two former chairmen of the Wisconsin Public Service Commission with similar names are causing no end of amusing confusion in Washington. John C. Doerfer, new chairman of the Federal Communications Commission, was predecessor on the Wisconsin Commission to James R. Durfee, chairman of the Civil Aeronautics Board.

At receptions and other social affairs Mr. Doerfer is often asked about aviation matters. Mr. Durfee is often asked about TV matters. Both men, good friends, have decided it's too much trouble to explain the mix-up so each one patiently listens to questioners without wising them up. Simpler that way.

Standby equipment

Howard Hughes took a new Lockheed L-1649A Jetstream with him to Montreal recently as his personal transport and kept it there a couple of weeks at the very time TWA was hard-pressed for the new aircraft. Hughes flew several hours a day in a TCA Viscount and the 1649 stood by doing nothing.

Why the high cost

At the peak of the House fight over the huge Defense bill, Republican House leader Joe Martin's tongue tripped him. Reading from a prepared statement, he accidentally referred to the Pentagon's new breed of weapons as "gilded missiles."

Juvenile R&D

Examining the wreckage of a radio-controlled model airplane that had gone beyond the range of its ground unit and crashed, an engineer—well known—engaged in R&D missile telemetering systems, was heard to utter a plaintive: "Gosh, these Mickey Mouse rigs are just like ours!"

Industry talk . . .

When CAA picked a new name last year for its office of aviation safety it left itself wide open to the nicknamers. Result—Office of Flight Operations and Airworthiness has been dubbed FLOPAIR. An omen?

• • •

Public relations men are not pleased with the new International Federation of Aviation Writers formed in Paris last month. It is open only to members of the working press. Rival organization, Int'l. Society of Aviation Writers, located in Canada, is open to PR men too.

• • •

One of the largest freight elevators in England is used to take guests to the VIP dining room at D. Napier & Son. But protocol at the British engine company requires that visitors return to street level via a fire escape on the outside of the building.

• • •

The gay (some say gaudy) interior of the Caravelle mockup shown at the recent Paris show was Air France's design, Sud-Aviation insists.

New candidate for Navy's seaplane fleet?

No, but the trimotor arrangement, asymmetrical wing and rough-water hull offer interesting design concepts for a "paper" air/sea rescue aircraft. Outrigger under wing forms "U" section into which retractable net is dropped to pick up survivors—raft and all. Engine and hull layout bear striking resemblance to anti-submarine warfare (ASW) design being developed for Navy by Convair.

PEOPLE

Brig. Gen. Arno H. Luehman (right), new USAF information chief, confers with his boss, Air Force Secretary James Douglas. After two months intensive briefings, Gen. Luehman has officially taken over duties of his new office. He's not new to the Pentagon information office, having served as Deputy Chief of Information Services under Gen. Sory Smith. ➡

John Hoving (left) and Willis Player confer after Hoving was elected vice president-public relations of Air Transport Assn. He succeeds Player, who resigned to accept a top public relations post with American Airlines in September. Hoving, a former Milwaukee and Madison, Wis., newspaperman, joined ATA last year as director of public relations. Player came to ATA in 1954 from Northwest Airlines where he had been vp-pubrel. ⬅

I. Irving Pinkel (right), chief of Flight Problems Div., National Advisory Committee for Aeronautics' Lewis Flight Propulsion Laboratory, receives NACA Distinguished Service Medal Lt. Gen. James H. Doolittle, Committee Chairman. Award was given for Pinkel's research and findings in aircraft crash-fire prevention and impact hazards to passengers. ➡

Arma Division, American Bosch Arma Corp., was host recently to 500 management men and special USAF guests. Maj. Alexander de Seversky (seated left) was guest speaker. Seated right is E. D. Gittens, vp-general manager, Arma Division. Standing, from left: Maj. Gen. Roger J. Browne, commander, First Air Force, and John J. Gallagher, president Arma Div. Management Club. ⬅

DUQUET

KEENER

ARDEN

ROBERTSHAW

DUNDAS

LETHERIDGE

MANUFACTURING

Name	New Position	Former Position
Ernest A. Duquet	Chief engr. air traffic control systems, Bendix Radio Div.	Engineer
J. W. Keener	President, dir. and member of exec. comm., The B. F. Goodrich Company	Exec. vp
Thomas T. Arden	President, Robertshaw-Fulton Controls Co.	Exec. vp
John A. Robertshaw	Chm. bd., Robertshaw-Fulton Controls Co.	President
John A. Dundas	VP-general admin., Douglas Aircraft Co.	General counsel
Harry N. Price	Chief project engr. and mgr., ramjet and dual cycle design, Wright Aeronautical Div.	Engineer
Dr. Myles L. Mace	Chm. management committee, Litton Industries	Vice president
Glenn C. Bach	Chief production test pilot, Republic Aviation Corp.	Production test pilot
Dr. Everett T. Welmers	Dir. Lawrence D. Bell Research Center, Bell Aircraft Corp.	
George A. Page, Jr.	Retired	Mgr. advanced analysis
Robert W. Walker	Gen. mgr., American Machine & Foundry Co.'s Dalkin Div.	VP-research and engrg., Aeronca Mfg. Corp.
Harold A. Goldsmith	President, Magnetic Amplifiers, Inc.	Asst. gen. mgr.
Herbert Herz	Exec. vp, Magnetic Amplifiers, Inc.	Vice president
Paul H. Skelton	Admin. asst., Narmco, Inc.	Vice president
Eric Tyler	VP-sales and service, Decca Radar, Inc.	With Solar Aircraft Co.
Clayton M. Opp (Capt., US CG, ret.)	Engrg. contract administrator, Wright Aeronautical Div.	Sales and service
Harry H. Greenwald	VP-finance, Pacific Airmotive Corp.	CO, Coast Guard Supply Center, Brooklyn, N.Y.
Miguel A. Xavier	Tech. dir., Cook Electric Co.'s Inland Testing Laboratories	Treas. and director
William W. Martenis	Mgr. semi-conductor activities, Minneapolis-Honeywell	Engineer
Percy Blackburn	Pub. rel. representative in Europe, Boeing Airplane Co.	Mgr. product extension activities
Edward Foodim	Asst. to pres., Consolidated Avionics Corp.	Managing editor, Interavia Magazine
Ira L. Kasindorf	Chief engr., Consolidated Avionics Corp.	Chief engr.
Robert E. Wolin	Gen. sales mgr., service and mfg. divisions, Howard Aero, Inc.	Chief engr., components div., Servomechanisms
RAdm. H. W. Seely (USN, ret.)	Field service engrg. rep., Texas Instruments Inc.	Dist. mgr., Lear, Inc.
Donald M. McDowell	Mgr. of engrg., Le Roi Div., Westinghouse Air Brake Co.	U.S.S. Whitley
Arnold H. Henriksen	Mgr. Beckman Instruments' Helipot Div. plant at Mountainside, N.J.	Chief development engr.
RAdm. R. S. Hatcher (USN, ret.)	In advanced planning, Aerojet-General Corp.	Chief production engr. Asst. chief of R&D, BuAer
F. P. Rice	Pres., Circuit Instruments, Inc.	Mgr. TV receiver div., Allen B. DuMont Labs.
John E. Slatky	VP, Sierracin Corp.	Mgr. technical sales
Edward F. Conklin	Gen. mgr., LearCal Div., Lear, Inc.	Mgr. Grand Rapids Div.
Vinton D. Carver	Mgr. Salt Lake City plant, Litton Industries	VP and gen. mgr., Pacific Div., Farnsworth Electronics Co.
Donald G. Richards	Chief, technical staff, Hamilton Standard	Chief, vibration and mechanical metallurgy
Walter C. Shaw	Chief, preliminary design, Hamilton Standard	Engineer
Robert R. Mawson	Sales mgr., transducer products, Consolidated Electrodynamics	Project chief
Geoffrey Hall	Chm. bd., Fairey Aviation Co., Ltd.	Managing director
James B. Lindgren	Sales mgr., Switch Div., Applied Science Corp. of Princeton	Western dist. sales mgr., Switch Div.
Richard M. Wight	Mgr. of information, data processing div., IBM	Business Week Magazine
W. M. Hylton	Asst. to vp and gen. mgr., Rheem Aircraft Div.	Engr., Ryan Aeronautical
Richard M. Fielding	Mgr. public information, Philco's Government & Industrial Div.	Mgr. pub. rel.
Fred M. Stefan	Exec. vp, Borg-Warner Corp.'s Marbon Chemical Div.	Vp and div. mgr., Swedlow Plastics Co.
John A. Curtis	Sales mgr., Avion Div., ACF Industries	Mgr. power equipment dept. Federal Telephone and Radio Corp.
William E. Boom	European sales mgr., Vertol Aircraft Corp.	European rep., Simmonds Aerocessories
Morton D. Weiner	Pres., Com-Air Products, Inc.	Executive vp
John Roback	Engrg. mgr., Fischer & Porter Co.	Chief project engr.
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Maurice Keating, Jr.	Chief pilot, Pacific Northern Airlines	Pilot
John L. Hammer	Mgr. sales admin., North Central Airlines	DSM, Minneapolis-St. Paul
J. William Bew	Resident mgr. aircraft engrg. for TWA at Convair	Service engr., N.Y.
C. D. McCollum	VP-national accounts in New York, TWA	VP-central regional sales
Jesse L. Boynton	Regional dir. Middle East and Asia, PAA	Asst. to div. traffic and sales mgr., N.Y.
Lloyd M. Wilson	Service mgr., Atlantic Div., PAA	Div. traffic mgr.
Robert B. Stevenson	Asst. to dir. traffic, Northeast Airlines	Asst. to gen. traffic mgr.
Capt. Rudolf Mayr	Chief capt., Lufthansa	Captain
John C. Wallace	Dir. sales and pub. rel., United Air Lines, in Far East	Sales staff, Seattle-Tacoma
Richard W. Gilbert	Asst. to pres., Alaska Airlines	Cargo sales mgr., Eastern Air Lines
Jean Dubuque	Pub. rel. mgr., Civil Air Transport, Formosa	Director, NBAA
L. C. Burwell, Jr.	Resigned	VP and asst. to pres., The Flying Tiger Line
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SAM SAINT SAYS

Ominous Words From CAB Member Denny . . .

TOWARD THE END of a fine speech in Pittsburgh the Honorable Harmar D. Denny, Member of the Civil Aeronautics Board, momentarily lifted the lid from a nasty can of worms.

"It will become necessary," said Col. Denny, "to exercise *positive* control authority over a large percentage of air traffice movement . . . A certain amount of control will, perforce, be removed from the cockpit and delegated to air traffic control centers on the ground . . . The day is fast approaching when the federal government must accept direct responsibility for operating an air traffic control system that is legally empowered to issue 'orders' to pilots in the air in order to insure air traffic safety."

With these harsh-sounding words Col. Denny has performed a valuable service. He has brought into the open one of the most important and least understood problems in air traffic control today.

On today's crowded super-highways of the air, pilots—especially airline pilots—carry a large weight of responsibility. Controllers, too, shoulder tremendous responsibility when they sit down at control boards and radar scopes. With responsibility must go the authority needed to meet that responsibility.

The present division of responsibility and authority between the pilot and controller is right and proper in the eyes of most pilots and most controllers. *It is significant that no meeting between pilots and controllers ever argues for a change in the balance of authority between them.* It is only when planners and policy people enter the picture that confusion begins. When controllers and pilots are left out of the discussion, the term "positive control" frequently takes on a subtle but fundamentally different meaning.

When pilots and controllers plead, as they are pleading today, for wider use of positive control, they are asking for extension and expansion of instrument flight rule control. They want the control agency to maintain positive *separation* of traffic as differentiated from relying on pilots to see and dodge the other traffic. For this purpose pilots will continue, as they have in the past, to accept orders that expedite traffic flow and keep flying machines safely separated. Some pilots will argue that they are accepting "clearances" of an "advisory" nature and are not accepting "orders." This is a mere play on words. Pilots accept control orders because to do otherwise would produce chaos.

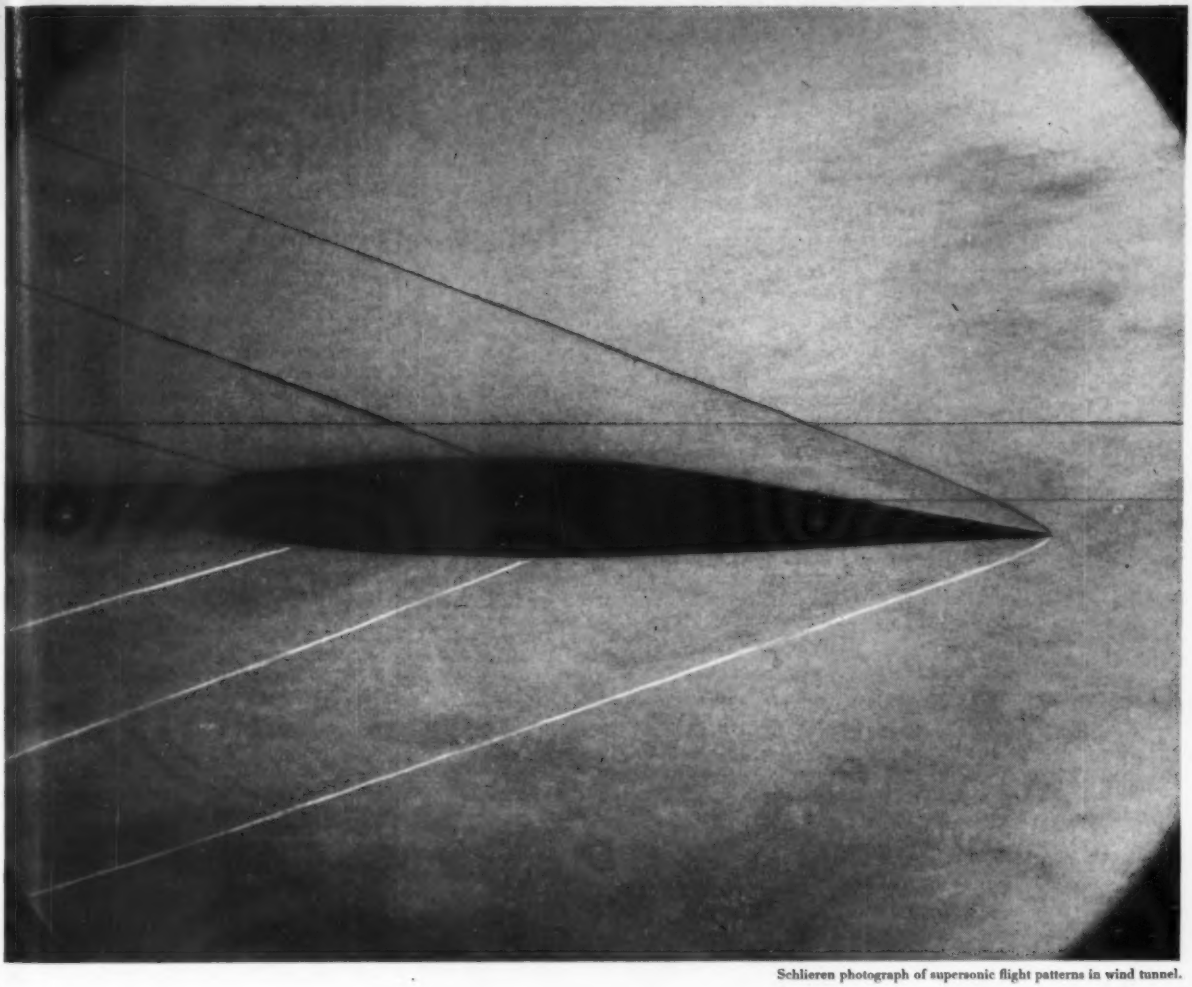
A tremendously significant twist is brought in, however, when certain technical planners attempt to convert air traffic control from a service agency to one that would dictate when and where aircraft could fly. Col. Denny told this reporter that ultimately, when congestion becomes acute, *pilots will have to divert to an alternate chosen and ordered by the traffic control system.* This would usurp pilot prerogative and dispatch and operational authority and impose a form of arbitrary flow control that airline pilots and airline operators will resist to the death. In fact, no sane airline passenger should want to fly in an airplane whose real captain was sitting at a control board on the ground.

This is not some vague threat for the distant future. Under the guise of military planning, several manufacturers are at this moment submitting bids for development of an air traffic control electronic computer applicable to the Common System. If pilots and dispatchers will submit to the operational orders of the new control system, the proposed computer might be made to work. If the airlines get stubborn and insist on making their own operational decisions (and they will) the computer development will have to start over.

It is beyond the realm of credibility to think that contract negotiation for this computer is in progress without coordination with the Curtis program. It seems a safe bet that this proposed control computer is, in fact, a piece of advance planning on the part of those who expect to control the Air Modernization Board that Congress is expected to create in the near future.

There is nothing wrong with fast action—if it is in the right direction. A policy decision on the balance of authority between the pilot and the controller is the starting point of any new development in air traffic control. Col. Denny's words at Pittsburgh suggest a decision is being made behind closed doors.

Airline pilots and airline operators and other users of the air space should knock on Col. Denny's door to find out if the puff of smoke he let out of the transom means there is fire within.



Schlieren photograph of supersonic flight patterns in wind tunnel.

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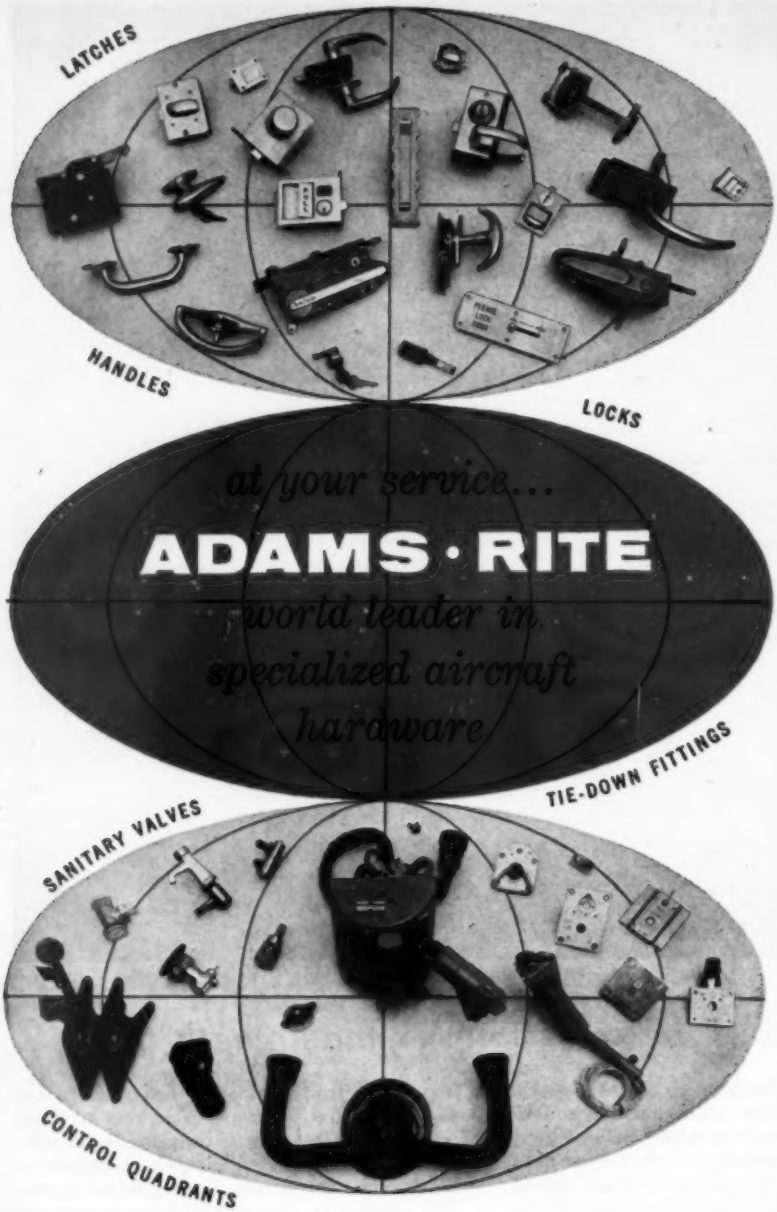

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Weather Analysis and Forecasting. *Second Edition. Volume II, Weather and Weather Systems. By Sverre Petterssen, Ph. D. 266 pages. $6.*

Volume covers production and transformation of air masses, temperature and humidity relationships, clouds and precipitation, quantitative precipitation forecasting, mist, fog and stratus, convective clouds and weather, weather systems, local forecast studies and application of synoptic climatology to weather prediction.

Petterssen is professor of meteorology at the University of Chicago.

British Standards Yearbook 1957. *Published by British Standards Institution, 2 Park St., London, W.1. Available from the BSI, or from the American Standards Association, Inc., New York. Price, $2.31.*

The 480 pages of this annual reference include 400 pages of detailed, descriptive listing of the 3,000 current British Standards. Although the BSI is not a government body, it has full official support and the British aircraft industry subscribes to the standards specified. The book is an invaluable reference for all who deal with British equipment, since it not only identifies material and other specifications but also lists the twelve complete reference sets available in the U.S.—from Wayne University, Michigan, to the National Bureau of Standards, Washington, D.C.

Aerodynamic Components of Aircraft at High Speeds. *Edited by A. F. Donovan and H. R. Lawrence as volume VII of the series "High Speed Aerodynamics and Jet Propulsion." Published by Princeton University Press, Princeton, N. J. 845 pp. Price, $17.50.*

The contributors to this text give an exhausting treatment of the high-speed characteristics of wings, bodies, propellers, diffusers, and nozzles. Interference effects and nonsteady flows are also examined.

In particular, the text discusses steady-state wing theory, and gives extensive tables of two-dimensional and conical flow functions for various aerodynamic shapes; the aerodynamics of bodies at high speed, with attention given to bodies of revolution and to bodies of noncircular cross-section, and interaction problems.

With enough stamina, an engineer will in most cases be able to find what he is looking for.—W. B.

The Aeroplane Directory, 1957. *Published by the Temple Press Ltd. Bowling Green Lane, London, E. C. 1, England. Price 21 shillings ($2.94) plus postage.* This is the most comprehensive and up-to-date reference to U.K. and Commonwealth aviation, covering government establishments, industry, airlines, learned societies, clubs and personalities. Information is grouped in nine numbered sections divided by marker cards.

FACILITIES

Permoflux Products Co. has concentrated all its offices at an enlarged plant at Glendale. Plant now covers 31,000 sq. ft.

Electronics Engineering Co. of California has occupied its new $550,000, 40,000-sq.-ft. building at Santa Ana. Building houses engineering laboratory, model shop and general offices of the company.

Eldon Fiberglass Manufacturing Co., Aircraft Division, has added 40,000 sq. ft. to its plant at Los Angeles. New plant is equipped with high-temperature ovens for research, prototype and volume production.

General Hermetic Sealing Corp. is expanding its plant at Valley Stream, N. Y. Addition will almost double the size of the present facility for increasing research and production activities.

Callery Chemical Co. is planning a plant at Lawrence, Kan., for the production of boron specialty chemicals for commercial use. To cost between $3 and $4 million, the plant will be fully integrated.

Precision Castparts Corp. has completed a $125,000 investment-casting and shell-molding plant at Portland, Ore. The 21,000-sq. ft. structure was occupied June 15.

Fairchild Engine & Airplane Corp. has announced expansion projects at three divisions. The Aircraft Division will build three buildings totaling 89,454 sq. ft. for work in connection with the Goose Weapons System project and the B-52 and F-27 program. The Engine Division will erect 34,000-sq.-ft. engineering office building, while the Stratos Division will add 23,300 sq. ft. to its plant.

Borg-Warner has announced plans for an expansion of manufacturing and engineering facilities at Weston Hydraulics, Ltd., subsidiary at Van Nuys, Calif. A 75,000-sq.-ft. building will be erected on a 32-acre site.

PSP Engineering Co. has moved into a new plant at Maywood, Calif. The 32,000 sq. ft. triples the area of the former plant at South Gate, Calif.

Babcock Radio Engineering, Inc. is consolidating all its divisions in one location at Costa Mesa, Calif. The company has opened a new 25,000-sq.ft. facility.

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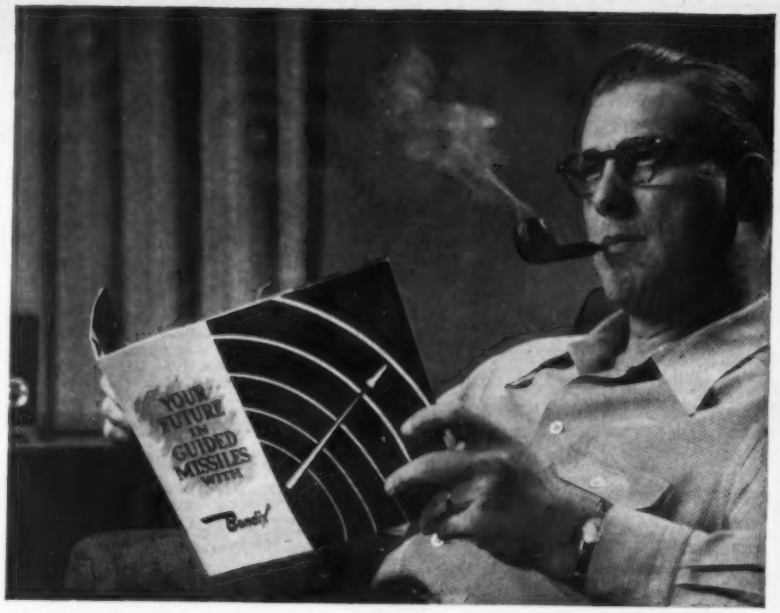

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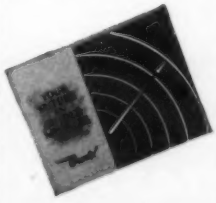

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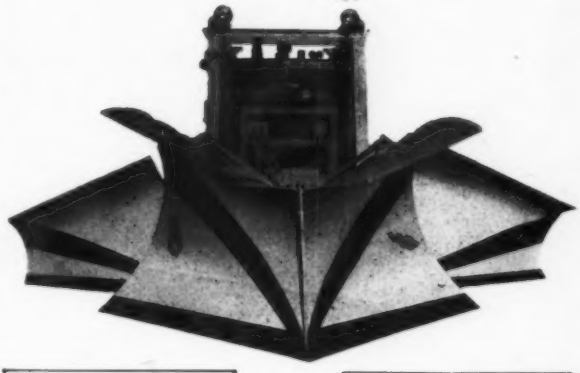

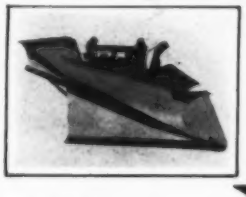

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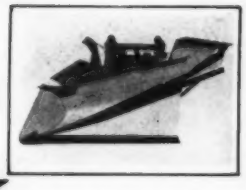

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EN ROUTE

by Wayne W. Parrish

Breakfast in Formosa, lunch in Hong Kong, dinner in Manila . . . and so to bed . . . in Australia

Amazing what you can do by airplane these days. Up early in the morning in Formosa, five hours including lunch in Hong Kong, dinner in a bay front hotel in Manila, Philippines, and arrival in Darwin on the north coast of Australia for breakfast. Take a look at your map.

Dave Edwins of Northwest drove me to Kai Tak Airport at Hong Kong for the 4 p.m. weekly flight of Qantas Empire Airways to Manila, Darwin and Sydney. It was a Super Constellation trip and departed on time with a pretty fair payload. Takeoff over the crowded harbor and out through the passageway to the open sea was almost as spectacular as the approach and landing.

It was my first flight on Qantas, an airline that began many years ago as a bush operation in the interior of Australia, and is now a major world carrier. If you still don't know why Qantas isn't spelled with a "u", the word stands for its original name of Queensland and Northern Territory Air Services.

The single cabin of the Connie was divided into first and tourist classes, a common practice in many areas of the world where daily frequencies are impossible. I thought the public address system was above par; the announcements were startlingly clear and the stewardess had excellent enunciation. I even thought the routine instruction about the use of life jackets and rafts was about the best I've observed. It's hard to make demonstrations more than humdrum when they have to be repeated over and over again but this crew did a fine job.

Confusion at Manila

It was after dark when we approached the Philippines and flew over the bay and well-lighted city of Manila and came in for a landing at Manila's strange airport. I say strange because every time I've ever been there the terminal is complete chaos, confusion, bedlam and continual construction. Manila terminal is one of those things which will never get finished as long as man inherits the earth. Sure, I know we have our Idlewild and our Chicago Midway, but they can't hold a candle to Manila. Without a doubt, I think, Manila takes the global trophy for the longest record of chaos.

Because the night hop to Darwin is 2,025 miles over the hundreds of Philippine and other islands, including Borneo, Qantas does a pretty thorough job of preparation on the ground. And since Manila airport is a torture even for a ten-minute stop, Qantas is kind to its passengers. It feeds them dinner in the Bay View Hotel in Manila. Powell, the Manila manager for Qantas, drove me there in his car and as it turned out I had a delightful couple of hours.

Seems that Andres Soriano, the Philippine magnate who owns or controls an awful batch of resources and interests around the world ranging from San Miguel beer and Coca Cola in the Philippines to the Muehlebach brewery in Kansas City and diamond mines and timber outfits in other parts of the world, had heard I was coming through so he dropped by the hotel for a chat.

Soriano owns a chunk of stock in Philippine Air Lines, although he has negotiated to sell most of his interest to Pan American World Airways, a deal which was brewing at the time but was unknown then to the PAL people. (Gave a good many Filipinos quite a shock when they found out later.) The government owns 51%. PAL has ideas of getting back into the international business in a big way but if it does so, it will now be as a PAA affiliate unless something snags the deal. I had talked with Soriano on the phone a number of times, but this was the first occasion I've had to meet him in person. In the group at the Bay View was my good friend Bobby Lim, a top-flight Filipino, a fine pilot, now vice president of traffic and sales for PAL, and one of the bright young stars in the global airline business.

The night flight to Darwin was seven and a half hours, not enough for a good sleep. By coincidence, among the capacity load was the Philippine delegation to the SEATO conference at Canberra, capital of Australia, and head of the delegation was the very same Garcia who is now president of the Philippines. It was while the delegation was in Canberra that the great president Ramon Magsaysay was killed in a tragic and unnecessary crash of a military C-47. My seat-mate that night was Garcia's aide, a young and smartly dressed Filipino.

We were awakened before dawn. The cabin was cool, and the weather a little turbulent. We were in the midst of the equatorial tropics. Just as the first sign of dawn appeared, we approached Darwin and landed in heavy rain. The outlook was pretty dreary as we stepped off the plane into the terminal.

So this was Australia. I had been there back in the war days of 1944 but only along the east coast. I had never before been to Darwin, a name to be found on every map no matter how small. I was getting off here to transfer to a MacRobertson-Miller DC-3 on the twice-weekly service down the west coast to Perth. (Or so I thought, anyway.) I discovered I was the only passenger getting off here. I later discovered that I must have been the sole passenger in about a year to get off a through service at Darwin.

Health, immigration and customs were slow. Very thorough, too, but the government men were all courteous. The passenger list evidently had a lot of complications because there were many nationalities on board and the Australians seem to have acquired more paper work to perform than in the U.S., if that's possible. In fact the U.S. has improved so much that I guess the Aussies can keep the trophy for awhile. The Philippine delegation moved through with no delay. I was kept to the last because I was getting off there.

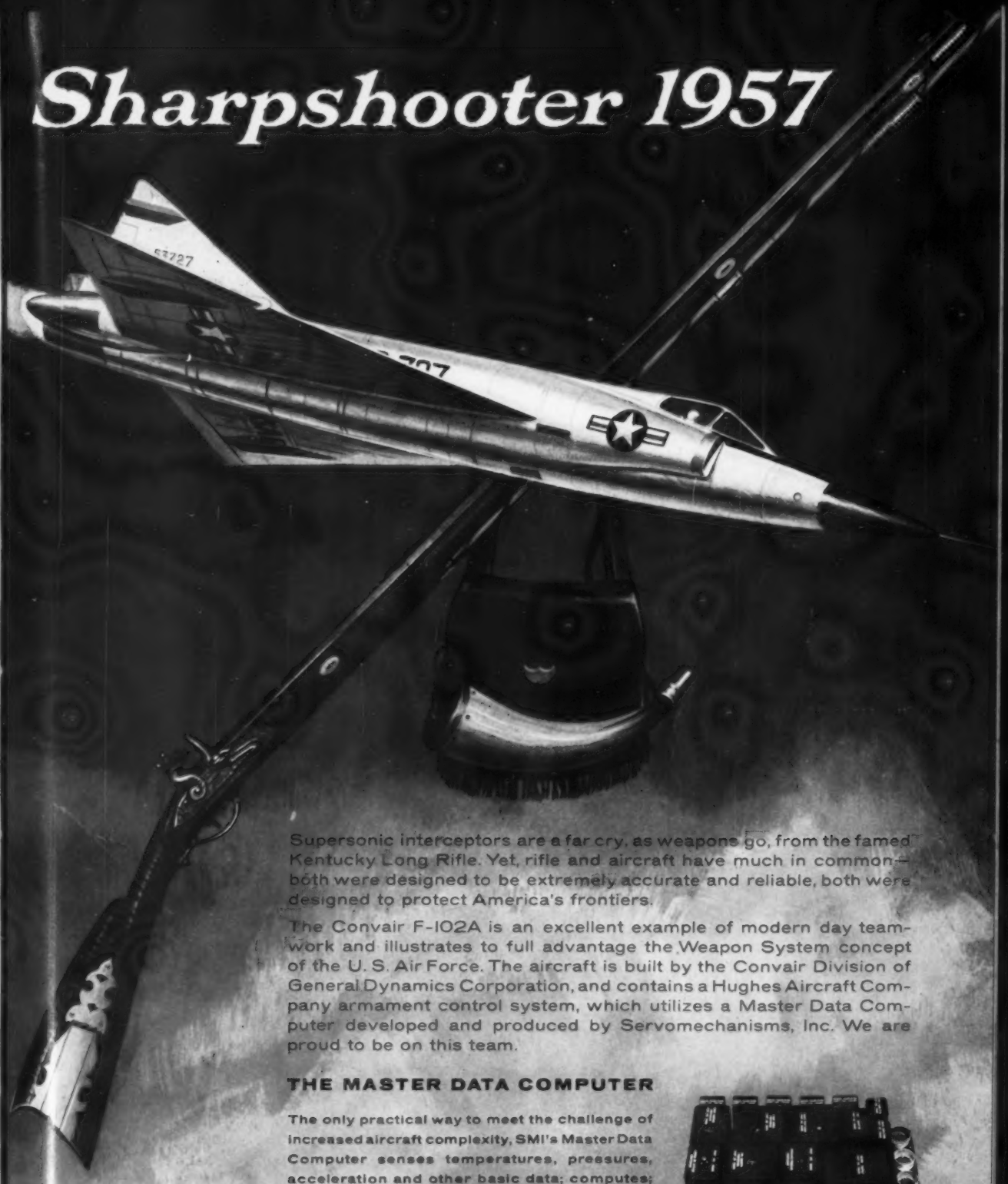
Time for relaxation

Often I lag behind the rest of the passengers because I like to watch procedures, but this time I was concerned about catching my DC-3. It was due into Darwin the day before and I hadn't seen it on the ramp as I entered the terminal, but still and all, if I missed it I'd have to wait three days. I mentioned my concern to one of the immigration men and he allowed as how I could relax. The DC-3 hadn't arrived in Darwin and might get in sometime that day, so I had plenty of time.

So relax I did. When I got to customs I declared the Chinese silk brocade and some costume jewelry stuff I had bought in Hong Kong, and some pearls I bought in Tokyo, and wondered what would happen. I explained that I was taking the stuff to the U.S. and certainly didn't want to pay duty in Australia. So the customs man suggested he seal the whole batch of stuff into one package and send it under bond to Sydney and I could pick it up when I left the country.

The whole operation took quite a bit of time. Customs insisted on inspecting and listing each item very meticulously, with umpteen carbons yet, so that they would be fully protected in Darwin if anything went wrong. I had to countersign all sorts of seals. I had doubts that I would ever see the stuff again but several weeks later it was waiting for me in fine condition at Sydney when I left for New Zealand. The guys in Darwin were most polite, but they sure made a production out of it.

Sharpshooter 1957



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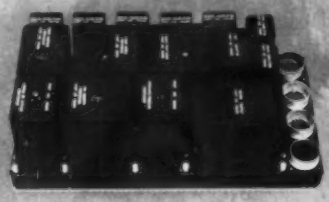

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John H. Logsdon, president, (right) and Robert L. Donovan, vice-president and secretary, Interstate Airmotive, Inc., Lambert Field, St. Louis.

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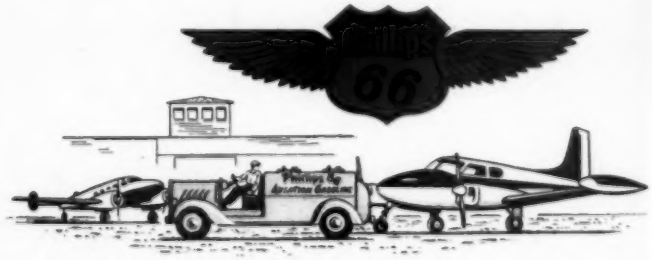

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